SEWING MATERIALS

WOMAN'S INSTITUTE
of Domestic Arts & Sciences
SCRANTON PA

SEWING MATERIALS

DEVELOPMENT OF TEXTILES
COTTONS, LINENS
WOOLS
SILKS, LACES

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WOMAN'S INSTITUTE
OF DOMESTIC ARTS AND SCIENCES
SCRANTON, PA.

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PREFACE

A knowledge of the romance, the story, that lies back of a handsome piece of material or a delicate bit of lace gives a new reverence for it, a new pleasure in handling it, and a keener desire to fashion of it something that shall be beautiful and worthy. No course in sewing, therefore, should be considered complete without its history of materials. And so the *Development of Textiles*, the first subject of this book, tells the fascinating story of the development of our present-day marvelous weaves, a story filled with the interest of an historical novel.

This leads the reader to the interesting account of the production and manufacture of the specific weaves, cottons, linens, silks, and wools, and she finds here authentic methods by which she may test the weight and firmness, the serviceability, and the color fastness of such materials and by which she may detect adulterations. Weighted silks and mixtures of silk and other textiles are no longer empty expressions to her, for she learns unerringly to test the nature of silken fabrics. Similarly, she learns to detect the presence of cotton in a supposedly linen or woolen fabric. At her convenience, too, for ready reference are the tables of materials, their names, descriptions, weaves, usual widths, normal prices, and the purposes for which they are commonly used, this providing her with information that aids her materially in purchasing materials.

So beautiful a craft as lace making merits more than the casual interest of women, and particularly of the dressmaking student. Appreciation and understanding of the beautiful varieties of handmade laces and the ability to distinguish them from the machine-made, is a cultural as well as a practical asset, and thus the portion of the book dealing with this subject possesses two-fold interest.

Coupled with the history of lace making and a description of the terms used in connection with the lace industry, the various kinds of laces are illustrated and described. Practically all of the laces

ordinarily used in dressmaking are discussed so as to prepare a woman to recognize any kind of lace when she sees it, to have a correct conception of its place in garment making, and to know whether it will give the service she desires of it.

The equipment of the student is thus enlarged and enriched by the perusal of this volume, and to her general fund of cultural information is added much interesting and useful knowledge.

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WOOL—(*Continued*)

SILK

LACES

DEVELOPMENT OF TEXTILES

ORIGIN AND GROWTH

1. The preparation of materials for body covering, chief of which are cotton, flax, silk, and wool, whether for ornament or for warmth and comfort, has demanded consideration from the earliest times. Primitive women, who were concerned with providing shelter and clothing for the family while the men were engaged in seeking food and in warfare, played an important part in the early development of the textile industry.

At first, women made clothes from the leaves and bark of certain trees or from the skins of animals, depending on the climate in which they lived. In tropical countries, the inner bark of one kind of tree was pounded until it was sufficiently thin and pliable, and then it was decorated and used for garments.

When skins were worn, the hair or wool was generally placed next to the body; so, in some cases, such as in wool, the fibers felted from the oils of the wearer's body. This marks the beginning of one form of textiles. Later, the dried skins of animals were tanned to make them smooth.

2. Probably weaving originated through the using of the reeds and grasses that primitive folk found in their wandering life. These were twisted, knotted, interlaced, and tied to make mats and baskets. Gradually, the fibers of plants and the coats of animals were woven, the first woven articles being used for floor coverings. With the occupations of men and women becoming somewhat stable, a pastoral life gradually came into existence and brought with it more desire for personal adornment. Weaving thus became an important industry and experienced many improvements.

During the agricultural era which followed, flax and cotton plants were widely cultivated and sheep were raised for wool. By degrees, life became more settled, households were established, and private ownership became the rule. In fact, by the time that America was going through her colonization, each home was a unit in itself, the mother and daughters spinning and weaving, while the father and sons prepared the fibers and made and repaired the machinery and tools.

3. The textile industry received considerable impetus through the various inventions that helped to perfect spinning and weaving. At first, only human power was used; then horse and water power were employed; and finally steam and electricity replaced both of these. With the increase of the demand and consequently of the production, the industry left the home and entered the factory. Thus, women have gradually given up the making of cloth except as they are employed in factories to do certain parts of the work.

SPINNING

4. Early Development.—The origin of spinning, which is a process of drawing out and twisting fibers in such a manner as to produce a continuous thread, is difficult to trace. One story is that of a shepherd boy who, while watching his sheep one day, noticed a bunch of wool hanging on a nearby bush. In his idleness, he began to twist the fiber and, as he twisted it, he drew the fibers apart and found that he could make a long thread from these comparatively short fibers. Some authorities entirely discount this story, claiming that, due to necessity, primitive woman was the inventor of spinning. Whatever its origin, it was with this invention that the true art of textiles began.

5. In the beginning, the spinner held the fibers in her left hand and twisted and drew them out with her right into a continuous thread, which she wound on a stick, called a *spindle*, as shown at *a*, Fig. 1. She had no means of keeping the fiber in order or even of cleaning it before it was spun. Very soon, however, the *distaff* made its appearance and shortly after it came the *whorl*. On one end of the distaff, which was a stick 12 to 18 inches long, the fibers were loosely fastened, as shown at *b*, the other end being held

under the left arm or stuck in the belt of the spinner so that both hands were left free to work with the fiber. The spinner soon found that it was much easier to spin with a full spindle than with an empty one, so she conceived the idea of weighting it with a whorl and it then consisted of a stick with a weight on the lower end, as shown in Fig. 2.

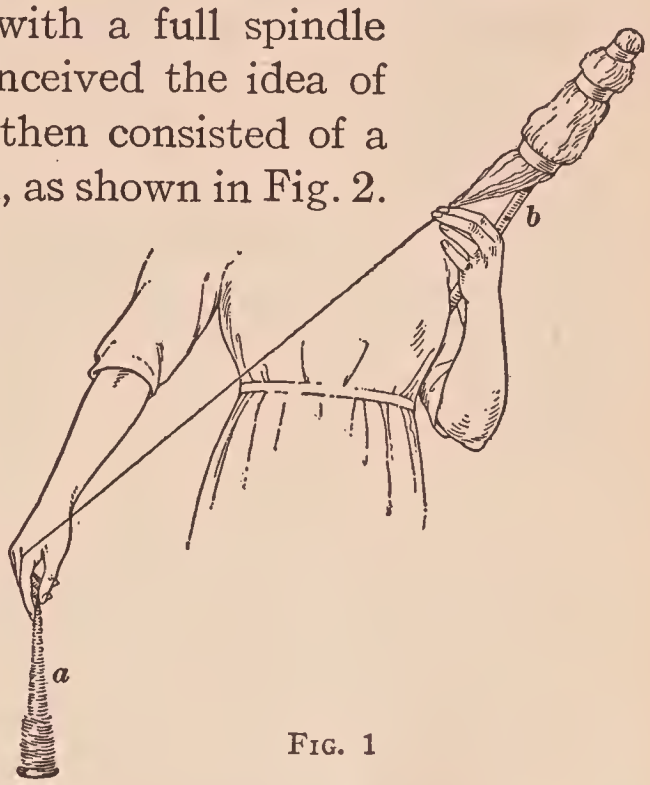


FIG. 1

With these two improvements in equipment, the *spinster*, as she was called, would draw out the fiber from the distaff with her left hand, attach the end to the spindle, and give the spindle a sharp twist with her right. She would then allow the thread and whorl to twist in the opposite direction. After twisting a considerable length, she would wind the yarn on the spindle, fasten it to prevent its unwinding, and begin the process again. The *rock*, a later improvement, was merely a distaff made with a standard, as shown in Fig. 3, so that it stood on the floor beside the spinster.

6. At the present time, the Navajo Indians of Arizona have an interesting method of spinning. With a slender stick for a spindle, the point of which is stuck in the ground, the spinner, sitting on the ground, pulls out the fiber and twirls the spindle to twist it. The yarn, when first spun, is very slightly twisted so that it must be gone over several times before it is ready for use in a loom.


FIG. 2

7. Kinds of Spinning Wheels.—Up to the 14th and 15th centuries, the distaff and weighted spindle constituted the spinning equipment. Then, they were replaced by the spinning wheel, the spinners of India fastening a wheel to a spindle and making it rotate by means of a band. This first spinning wheel known to history was called the Gharka wheel of India. It was a very crude instrument and spun only very coarse yarns, but it had the advantage of providing a more rapid method.


FIG. 3

8. The *great wheel, wool wheel,* or *muckle wheel,* as shown in Fig. 4, was the next to make its appearance. It was called the *great wheel* because it had a large wheel. As it was used extensively in Scotland, it received the name of *muckle wheel,* muckle meaning great in the Scottish dialect. The term *wool wheel* was applied because it was best adapted to the spinning of wool fiber on account of the shortness of the fiber and the slow, intermittent motion of the wheel.

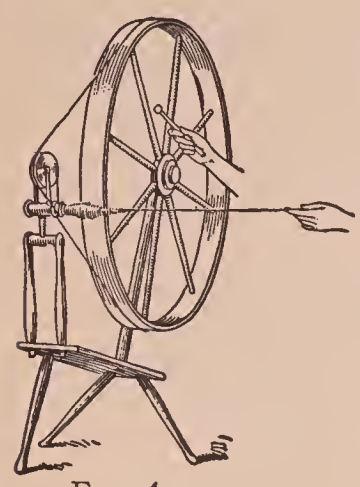


FIG. 4

To spin with this wheel, a portion of the fiber was drawn out and attached to the spindle; then the great wheel was struck with the hand or a wooden peg, the blow causing it to revolve, turn the spindle to which the fiber was attached, and twist the fiber. To wind up the yarn, the wheel had to be revolved in the opposite direction. When the spindle was full, the thread was wound off on a reel. It has been estimated that spinners who worked at this type of wheel walked as many as 20 miles a day as they spun. The principle of the great wheel is still used in our modern wool manufacture, but the mechanism has been so greatly improved that practically all of the work is now done by the machinery.

9. The *flax,* or *Leipsic, wheel,* shown in Fig. 5, which is the one we ordinarily see as an heirloom, with its distaff, spindle, and flyer, and which is adapted to flax spinning, was a complicated piece of machinery when compared with the great wheel. It was a labor-saving invention in that it had a treadle for transmitting the power and permitted the spinner to sit down while spinning. The flyer, which was not found on the great wheel, revolved very rapidly, twisting the fibers and winding them on the bobbin. However, the spindle's motion was held back by the spinner, who changed the yarn from one hook to the other of the flyer and gradually filled the bobbin evenly. The motion of this wheel is continuous, that is, the fiber is drawn out, twisted, and wound up at the same time.

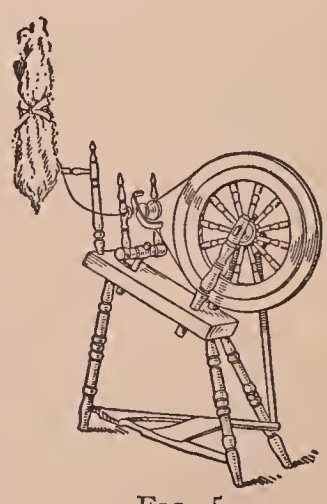


FIG. 5

10. Carding.—In order to have a smoothly spun, clean yarn, it was necessary to clean the fiber and make it fine and soft before spinning. This was done by means of *carding.* Primitive

woman used her fingers for carding, opening up and straightening the fibers into a soft lap. Later, *cards*, which were flat brushes containing bent wires set closely together in strips of leather tacked to the wood, were made for this purpose. With two of these cards, one in each hand, as shown in Fig. 6, fibers could be made very clean and fluffy and laid out to form parallel strands.

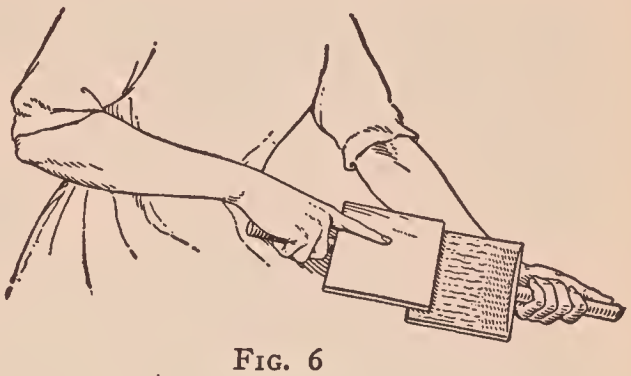


FIG. 6

11. In 1748, Lewis Paul invented a machine for carding, which consisted of revolving cylinders covered with wire cloth. John Lees, in 1772, invented an *apron feed*, a device that made it possible to put a large quantity of fiber in the machine at one time. Richard Arkwright was responsible for an invention by which the fiber was delivered from the carding machine in *laps*, but a short time after the apron feed was invented a funnel was attached to the card, thus making the raw material into a *sliver*. After being carded, either by hand or by this machine, the fiber was ready for spinning on either the great wheel or the flax wheel.

12. Improvements in Spinning.—About the middle of the 18th century, there came an increased demand for materials. While the improved machinery made it possible to card the fiber ready for spinning and to weave the cloth on power looms, still the yarn was spun by hand. This, of course, held up production. To John Wyatt is due the honor of producing the first yarn spun without the use of the human fingers, a feat he accomplished in 1737. His machine drew the fiber through two moving rollers, which also used the flyer of the flax wheel.

13. Up to this time, but one thread was spun at a time. James Hargreaves, an Englishman, was the first to work out a method of spinning a number of threads at the same time. The idea came to him one day when he saw a spinning wheel overturned, leaving the spindle revolving in a perpendicular instead of a horizontal position. Seeing at once the possibility of having a number of spindles revolving in this position, he made his *spinning jenny*, which spun eight threads at one time. It had an intermittent motion like the great wheel, but it spun thread that was not strong

enough for warp. Hargreaves' invention made him very unpopular with his fellow workmen, who persecuted him bitterly, for they felt that he was taking their work from them.

14. The next improvement in spinning was Arkwright's *water frame*, which was brought out in 1768. This machine was too heavy to be driven by hand, so that mule or horse power was required. Later, water power was used, which gave it the name of water frame, and in 1790 steam was employed. The action of the water frame was continuous like that of the flax wheel and that used today in ring spinning. In fact, the principles of both the modern mule and the ring-spinning frame are the same as those of the great wheel and the flax wheel. The differences lie in the mechanism that has been devised to take the place of the hands.

15. Samuel Crompton, in 1779, patented his spinning machine under the name of the *mule-spinning frame*. Containing the good features of both Hargreaves' and Arkwright's inventions, it was more valuable than either of these before steam power was used. Later, when steam could be utilized for power and when Whitney invented his cotton-ginning machine in 1793, cotton spinning received a great impetus.

It was when water and steam were used for power that the textile industry was taken from the home to the factory. But the principles of the machines used today in the largest factories are practically the same as those set forth in the inventions of Hargreaves, Arkwright, and Crompton, with merely the substitution of machinery for the hand work formerly done by spinners.

WEAVING

NATURE AND HISTORY

16. Weaving is the process of interlacing into a fabric two sets of threads or strips of pliable material that cross each other at right angles. The threads that run the entire length of the material and form the foundation for weaving are called *warp threads*, as indicated in Fig. 7. The threads that cross and interlace with the warp threads are called *weft*, *woof*, or *filling*, threads. At

each side, the weft, or filling, threads, are woven very closely and bind the warp threads into a firm edge, which is called the *selvage*.

As the warp threads have to bear a very great strain, they are very strong and nearly straight, as can readily be determined by observing and testing the ravelings. Weft, or woof, threads are often softer, less wiry, and of less even weave than the warp threads. A sharp sound usually accompanies the tearing of material across the warp threads, whereas a dull sound results if a lengthwise tear, or one across the weft threads, is made.

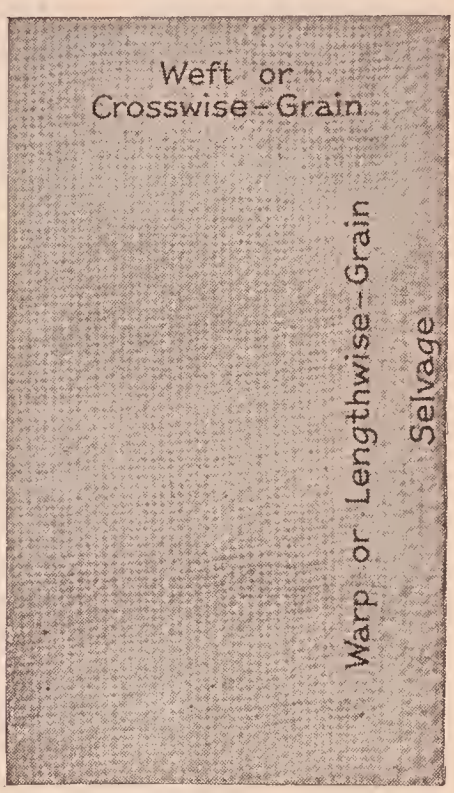


FIG. 7

17. History of Weaving. — Textile weaving dates back into prehistoric times, for in the earliest written records are to be found occasional references to a weaving industry well developed. Silk, wool, linen, and cotton of rare quality were all in use in those early days; in fact, the textiles that were woven in various parts of the Orient have perhaps never been excelled in richness of fabric, splendor of color, and intricacy of design. Even though everything points to an early and flourishing industry in weaving, very few of the looms of antiquity are preserved to us either in picture or in literature. In their pottery painting, the Greeks have handed down the looms of Penelope and Circe, which are examples of the early Greek looms. A picture of an early Egyptian loom is also available.

Both the Egyptian and the Greek looms are *vertical*, or hold the warp threads in an upright position. The chief difference between these two looms is that the Egyptian began to weave at the bottom, while the Greek wove from top to bottom, small weights being attached to each warp thread.

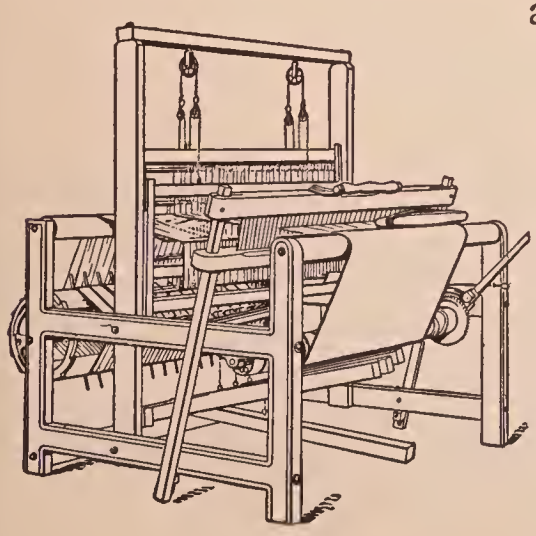


FIG. 8

18. The vertical loom existed until the 15th century. Then the *horizontal loom*, which is shown in Fig. 8, and in which the warp threads lie in a horizontal position, took its place.

19. The invention of the *fly shuttle*, in 1738, by John Kay meant a great deal in power weaving. In 1750, he made some improvements on it and, in 1760, his son invented the *drop box*. Both of these inventions made the work of weaving easier and quicker. Later, when Cartwright brought out his power loom, in 1789, and steam was applied to Arkwright's spinning frame, the work of making textiles by power was established.

20. Principles of Weaving.—In weaving, whether done on a primitive loom or on the modern power loom, three operations are included: shedding, picking, and battening.

21. *Shedding* is the process of raising the warp threads as needed. At first, it was accomplished by raising each warp thread with the hand and slipping the weft thread through the space made. After a time, a simple contrivance known as a *harness* was devised, by means of which one set of warp threads could be raised at one time, the weft slipped through, and then the other set of warp threads raised.

22. *Picking* is the process of throwing the weft threads across the warp. In the primitive methods, picking was accomplished very laboriously without even the use of an elementary shuttle. Later, however, the shuttle came into use and by means of it the weft threads were carried through the *shed* very quickly and easily.

23. *Battening* is the process of pressing the weft threads against the finished cloth to make a firm fabric.

VARIETIES OF WEAVES

24. The two ways in which weaving is done produce two main classes of weaves: straight-line warp weaving and curved warp weaving.

25. Straight-line warp weaving includes the three foundation weaves: (1) the plain, taffeta, or tabby, weave; (2) the twill, or diagonal, weave; (3) the satin, or sateen, weave.

26. The *plain weave*, as illustrated in Fig. 9, is the simplest of all weaves and, if coarse yarns are used, may be made on a two-harness loom. In it one weft thread merely passes over and under

one warp thread, as shown in Fig. 10. The plain weave is used principally for light-weight goods, such as voile, muslin, gingham,

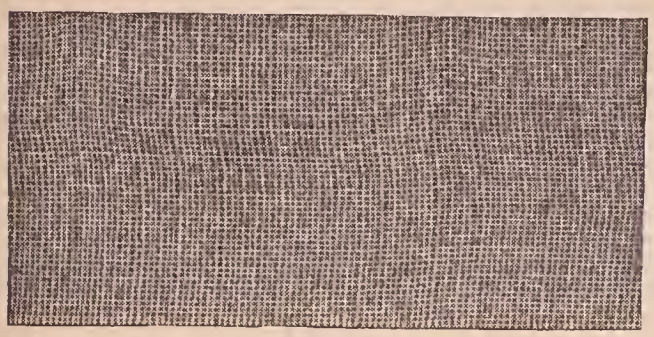


FIG. 9

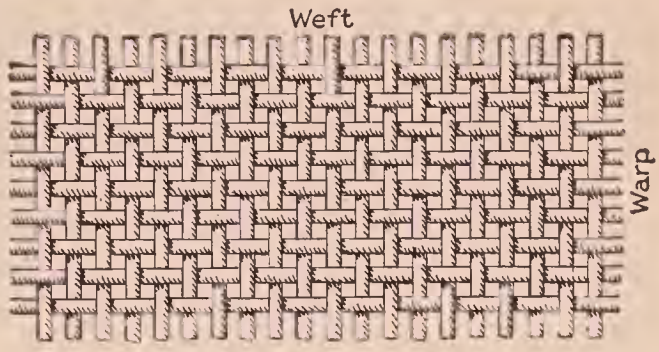


FIG. 10

linen, and nainsook. It is the least expensive weave to produce and requires the smallest amount of yarn or thread.

Variations of the plain weave are found in the basket and Panama weaves. The basket weave is made by weaving two or more weft threads over two or more warp threads. The Panama weave is really a plain weave, but a different effect is gained by having the weft thread much heavier than the warp.

27. The *twill*, or *diagonal*, *weave* is more elaborate than the plain weave. In its simplest form, the twill weave consists of one weft thread passing over two warp threads and then under one warp thread, this being sometimes called the prunella weave. Twill weaves vary greatly and consequently give us a large variety of materials, such as tricotine, serge, and gabardine. In serge, which is illustrated in Fig. 11, one weft thread passes over two warp threads and then under two warp threads, as Fig. 12 shows. In twill materials, the twill may run to either the right or the left, but in the majority of cases it runs to the right, a characteristic

FIG. 11

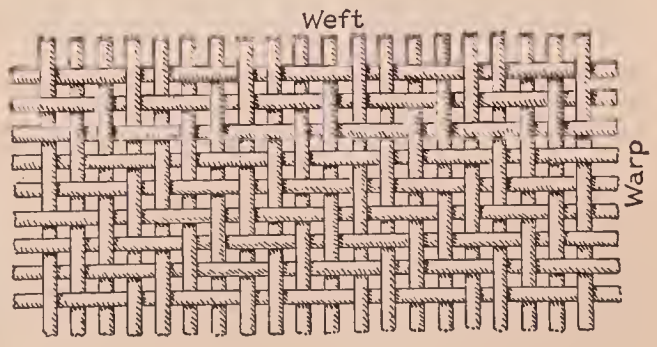


FIG. 12

that helps to determine the right side of twilled materials. Many threads are used in the twill weave, making firm. durable materials.

28. The *satin*, or *sateen*, *weave*, shown in the satin in Fig. 13, is an important one for it is used in all fibers. In reality, it is a

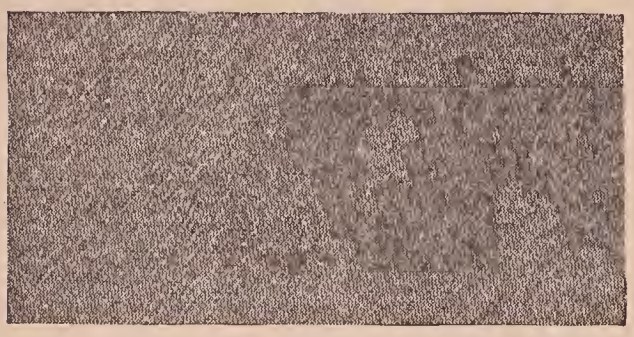


FIG. 13

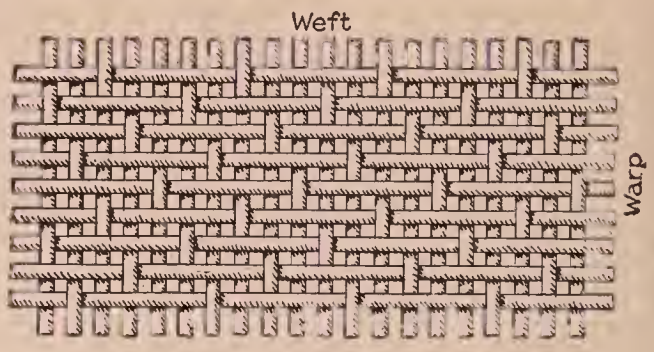


FIG. 14

form of twill, as shown in Fig. 14, but the interlacing of the fibers is done so that the twill does not show and a smooth, lustrous surface with many loose, or floating, threads is produced.

The satin weave differs from the sateen weave in that the warp threads form its surface, whereas in the sateen weave the filling, or weft, threads form the surface. Usually, the satin weave is used for silk and wool fibers, and the sateen, for cotton. It is also an excellent weave for a combination of fibers, such as silk and cotton, as in cotton-backed satin.

Besides in satin and sateen, the satin weave is found in such materials as galatea, Venetian cloth, messaline, and foulard.

29. **Curved warp weaving** includes the leno weaves, the pile weaves, the double-cloth weaves, the figure weave, and the lappet weaves.

30. *Leno weaving*, which is shown in the marquisette in Fig. 15, consists of weft threads with the warp threads wound around them,

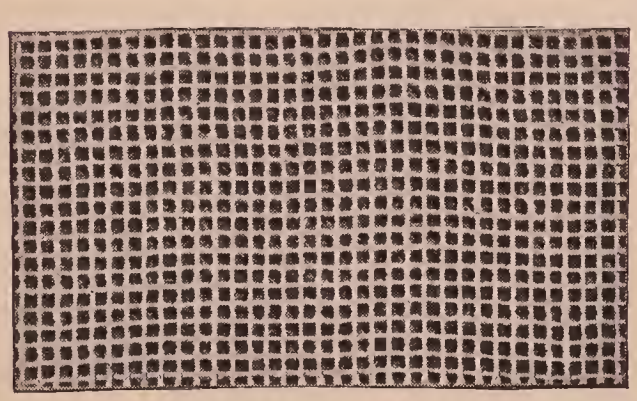


FIG. 15

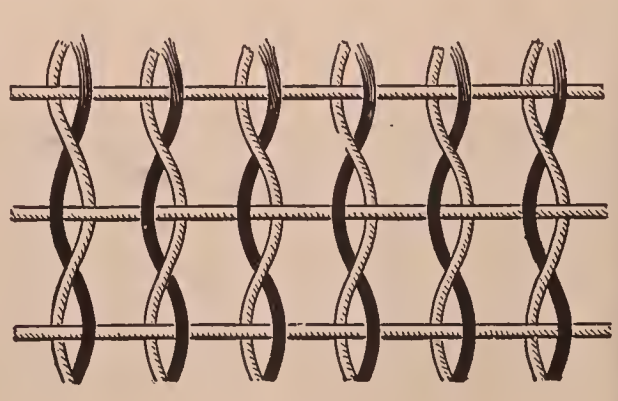


FIG. 16

as shown in Fig. 16. This weave is used extensively in curtain scrim, but as it will not permit of having its threads drawn length-

wise, such material should not be purchased with the idea of hemstitching it by hand. The leno weave is found also in silk grenadine and marquisette. When it is closely woven, it is durable, but often it is very open and loose.

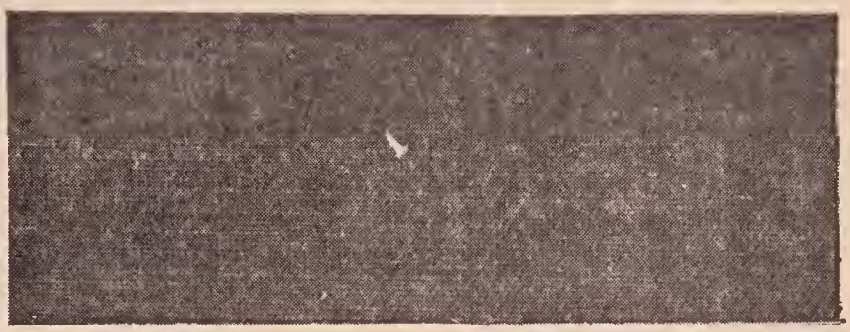


FIG. 17

31. The *pile weave*, shown in the velvet in Fig. 17, is the one in which the beautiful velvets of the world are produced. In this weave, the ground may be a plain, a basket, or a twill weave. As shown in Fig. 18, there are generally two sets of warp threads, as at *a* and *b*, which are held by the weft threads, as at *c*. One set of warp threads forms the pile, and in weaving these are held loosely so they may be drawn over wires to form loops, which are afterwards cut to produce the pile surface. Plushes, corduroys, bolivia, chinchilla, rugs, and carpets are other examples of this weave. Some of the plushes and velvets are in reality double cloth, being cut between the cloth.

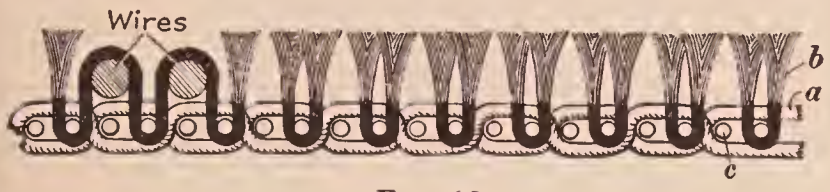


FIG. 18

In another group of pile fabrics, such as terry cloth, which is used for towels and wash cloths, the pile is in the form of loops of threads instead of ends.

These materials should not, under any circumstances, be confused with those that are napped, such as outing flannel or broadcloth. The *nap* is produced by brushing the loosely woven cloth until a rough appearance is obtained. In duvetyn and velour, the fabric is matted, but in the case of broadcloth, it is pressed after napping to give it a smooth, mirror-like appearance.

32. The *double-cloth weave* is used in fabrics that are woven with two sets of warp and two sets of weft threads. Special warps and a double harness are needed for weaving of this kind. Often, double-cloth materials are held together by means of catching an occasional weft thread through to the opposite surface, and thus they become reversible, as heavy coating, polo cloth, rugs, and double-faced ribbons. Other times they are made by fastening two materials together with glue or mucilage. Again, they may

be woven so as to be fastened on one or both edges to make tubular materials for lamp wicks, hose, and bags.

33. The *figure weave* is a combination of the three foundation weaves—plain, satin, and twill. The simple figure weaves, such as diaper patterns, huckaback, and granite, are done on a regular loom, but for intricate figure work, such as is found in damasks and brocades, the Jacquard loom is required.

Brocades have a right and a wrong side, whereas damasks are figured on both sides and are therefore reversible.

34. The *lappet weave* consists of a plain weave with patterns woven on the surface to resemble hand embroidery. It is done by means of an attachment called a *lappet*, which is applied to a regular loom. The extra threads on the wrong side are cut off after the pattern is applied. Lappet weaving produces many pretty materials, dotted Swiss being the principal example, but they are not very durable as the process through which they pass during the weaving weakens them considerably.

35. Bedford cord and piqué have characteristics peculiar to themselves. They are sometimes known as cord weaves, but they may be called "backed" fabrics because they carry an extra set of warp threads at the back of the fabric. The one set of warp threads weaves in the usual way with the weft, while the extra set carried at the back of the fabric interlace with the weft threads at regular intervals, producing a lengthwise ribbed effect of a rather wide wale. Sometimes, a crosswise rib is produced by reversing the warp and weft, the weft forming the filling at the back of the material.

36. Certain materials, such as bobbinet, maline, and tulle, contain weaves that cannot be classified as any of the regular textile weaves because of their construction. They have two sets of threads that correspond to the warp and weft of other materials, but these threads are woven on lace machines that permit varying degrees of tension and therefore cause the weft, or bobbin, threads to become twisted with the warp threads. To distinguish them from other materials, they may be designated as lace weaves.

KNITTING

37. Knitting is the process of making fabrics by looping a single thread, either by hand or by machine, each succeeding line of the thread being looped into the one before it. This art has been known for centuries, our grandmothers having knitted by hand large quantities of wool into stockings and mittens. The modern knitting machine has a great number of hooked needles, which open and close automatically and hold each loop as the knitting is done. If one loop is dropped, the whole web is threatened with destruction.

Knitting yarn, which is softer and less twisted than weaving yarn, produces an elastic material that is used principally for underwear, hosiery, gloves, scarfs, etc. Sometimes it is plain and other times, ribbed, the ribbed varieties being more expensive and usually better wearing than the plain ones.

The chief knitted fabrics are tricolette, Jersey, and stockinette. Some materials, such as eiderdown and chamoisette, have a knitted background through which soft yarns are passed to make a fuzzy surface.

CLOTH FINISHES

38. It must not be thought that a fabric is ready for use as soon as it comes from the loom or the knitting machine. Just the contrary is true, for it is then in an unfinished condition and is called *raw thread*. It must be treated in various ways, depending on the nature of the material and the finish to be applied.

39. Practically all materials must be *scoured*, or washed in hot water and soap, in order to remove any dirt, oil, or other foreign substance, such as *size*, a starch-like dressing put into certain warp yarns to make them easier to handle. Often it is necessary to *burl* materials after weaving, that is, to pick out any knots, burrs, and similar imperfections found in them.

40. *Singeing* consists in treating the surface of material to make it smooth after taking it from the loom. This is done by passing it over heated metal rollers to remove the loose nap.

41. *Fulling* is another operation through which many woolen materials are put to give them a stronger and firmer body. This

process shrinks the threads and makes the fabric compact and smooth. In the case of broadcloths and other nap-finished materials, the fulling is carried on until the fibers become densely matted and cover up the weave. Tweeds, on the other hand, are fulled only to the extent of giving them a dressed surface, and certain other materials merely have their texture strengthened in the fulling.

During the fulling process, the material is frequently taken out, stretched, straightened, and inspected. When it has been sufficiently filled, it is freed from the soap by being rinsed, first in tepid water and finally in cold water.

42. To raise the nap of woolen material that has been fulled, it is *teasled;* that is, the surface fibers are pulled out or broken to produce an unequal nap. For this purpose, a thistle-like plant covered with a hook-like growth and called the teasle, is employed in the production of high-grade fabrics, although a metal device, also, is used to nap materials. After the nap is raised, it is cut to make it uniform. Sometimes the nap is pressed, and again it is allowed to stand upright.

43. Many materials are put through a process called *calendering* to give their surface a smooth, even finish and sometimes to glaze them, as in sateens and silesias. Calendering is accomplished by running the material over warm cylinders, pressure and steam being employed in the process. The glazing of materials is brought about by putting them through rollers that move at different velocities.

BLEACHING

44. Before materials can be dyed or printed, they must be freed of their natural coloring matter and any oily substances that they contain. Sometimes it is found sufficient to scour the fabrics, but usually bleaching is also necessary.

45. The process of bleaching consists of freeing textile fibers and fabrics from their natural color in order to whiten them. In ancient times, bleaching was done by exposing the material to the direct rays of the sun and wetting it at regular intervals. This method, while followed for many years, and even now used in some parts of Ireland, proved unsatisfactory because of the change-

able weather conditions, the length of time required, and the possibility of losing much of the material through theft.

The increase in the demand for cotton materials created a need for quicker and better bleaching methods. The use of powerful chemical preparations has practically supplanted the former methods, especially where large quantities of material are to be bleached in big manufacturing plants. Chlorine is generally used for the vegetable fibers, that is, for cotton and linen, and sulphurous acid for the animal fibers, silk and wool. In the case of linen, grass bleaching is sometimes combined with the chemical treatment.

DYEING AND PRINTING

46. The final step in the preparation of material for the market is dyeing or printing or both. *Dyeing* is the art of fixing coloring matter in the substance of a textile by immersing the fabric in the color solution, while *printing* consists in applying color to only certain portions of a fabric by means of a machine. In some materials, these processes are combined. As would naturally be expected, printed colors are not so lasting as dyed ones, although many attractive and unusual designs can be produced by the printing method.

47. Origin of Dyeing.—Dyeing was known in the most ancient times, for we find mention of it in the oldest writings and some of the mummy clothes found in the pyramids contain borders of colors. However, it is thought that dyeing was not a common art in those early days, for dyed materials were put to only certain uses and were worn chiefly by persons of unusual distinction.

The early dyers used only the products of nature or very simple preparations, such as brickthorn berries, gall nuts, sumac, sandalwood, madder, cochineal, and logwood. These natural dyes are still used in the East for the dyeing of the yarn for Oriental rugs, a fact that accounts for the wonderfully soft and beautiful colorings of these rugs even after long use, the natural dyes fading in tones of the same hue.

48. Origin of Artificial Dyes.—It was not until 1856, when Perkin, an Englishman, discovered the first coal-tar dye, mauve, that synthetic dyes, or artificial coloring matter, came into use.

This discovery produced a revolution in dyeing methods, for the products of coal tar, the pitch distilled from bituminous coal and condensed in the manufacture of coal gas, chief among which is aniline, have formed the basis for practically all dyeing materials since. Many other discoveries followed, chemists producing from time to time materials that closely resemble the natural dyes in effect although they bear no similarity to them in chemical composition. In fact, these synthetic dyes have nearly supplanted the natural ones.

A very important step in the history of dyeing was the discovery in 1870, by a German chemist, of a way to transform an extract of aniline into alizarine, a coloring matter identical with madder, one of the most ancient of natural dyestuffs. When this material was available for the trade, it practically drove the natural product, madder, from the market.

49. Methods of Piece Dyeing.—Dyeing cloth with coal-tar dyes is done in three ways: by direct, basic, and vat dyeing.

50. *Direct dyeing* consists in subjecting the cloth to a dye bath and, by means of frequent turnings of the cloth, transferring the color to it. Dyeing of this sort is not likely to produce such good results as that done by the other methods.

51. *Basic dyeing* is that which requires the services of a mordant to make the dye permanent. By a *mordant* is meant a substance that will fix colors. To accomplish this, it must both penetrate the fiber of the material and combine with the dye-matter in such a way as to form an insoluble compound in or out of the fiber. Various substances, such as tannin, gelatine, gluten, albumen, soda, and lead salts, are used as mordants. The most common method of dyeing with a mordant is to work it into the cloth and then to apply the coloring matter. The art of the dyer consists in combining the cloth, the mordant, and the dye so as to obtain a color that will be chemically combined and permanent.

52. *Vat dyeing* has long been in use in Germany but has only recently come into use in the United States. This form of dyeing is interesting in that the cloth may not have the desired color when it is removed from the dye bath but assumes the correct color on being exposed to the air. Indigo is one of the colors that develop by oxidizing, or exposure to the air.

53. Methods of Fiber Dyeing.—In contrast with these methods of dyeing in the piece are several methods of dyeing fibers before and after they are spun. *Dyeing in the wool* consists in dyeing the wool after it has been washed and scoured and before it is dry. *Dyeing in the slub* means the dyeing of wool after it is carded and combed but not twisted. *Dyeing in the skein* is the dyeing of yarn after it has been spun and is in skein form, a form of dyeing used for ginghams, wool plaids, and novelty effects.

54. Dyeing Figured Material.—Practically all the dyeing methods that have been explained produce plain-colored materials. If a figured or striped material is to be manufactured, it is usually dyed by means of resist or discharge dyeing.

55. *Resist dyeing* is used for material containing a combination of fibers, such as cotton and wool, or for fabrics in which a stripe or a design of another color is found. One of the fibers or colors is treated so that it remains unchanged in the dye that colors the other part. In the case of the Batik work of Java, which is a form of resist dyeing, the part that is not to be dyed is covered with wax, which is later removed.

56. *Discharge dyeing* consists in dyeing the material in the piece and then removing some of the coloring by means of chemicals in order to produce figures, dots, and stripes. Considerable experiment is required in discharge dyeing to determine the right bleach for each dye.

57. Printing of Fabrics.—Printing, which has come to be a science in itself, is done chiefly in the case of such materials as calico, voile, percale, and galatea. The cloth is first prepared by singeing, bleaching, scouring, and starching it. Then it is printed by being put through a machine that contains engraved copper rollers bearing the design, a different roller being required for each color that the pattern contains. If a dye is used that will mix with the cotton without the use of a mordant, the process is very much simplified.

When a mordant must be used to fix the dye, it is usually applied first by means of a roller over which the cloth is run. The cloth is then dried by steam-heated cylinders, after which it is relieved of its acid by various processes so that its mordant is left in the

pure form. A thorough washing in soft water completes the preparation for the dyeing.

With the material properly cleaned and containing only a faint outline of its pattern, it is immersed in a bath of alizarine, from which it comes out a completely printed fabric. This solution has the power to produce all the colors that were printed on the material by the mordants. A final boiling in soap and water to brighten the colors brings the fabric up to its finishing processes—calendering, folding, or rolling for the market.

58. Block Printing.—The earliest form of printing was known as block printing. Now it is used chiefly in art work, having been superseded by machine printing in the manufacture of fabrics. In block printing, the design is cut out on a block of wood, the parts that are to make the impression being left prominent and the rest of the block being cut away. The color is supplied to the block, which is then pressed firmly on the fabric in order to transfer the design. As can be imagined, this is a process that, while it produces extremely beautiful, artistic effects, is too slow to be used commercially.

COTTON

PRODUCTION AND MANUFACTURE

1. Cotton is a downy vegetable fiber obtained from the boll, or seed pod, of the cotton plant. This plant grows from 3 to 6 feet in height and is native principally to the island and seacoast regions of the tropics, although it is raised successfully in other places. A sandy soil and a warm climate are necessary for its growth.

The earliest cotton was produced in India, Dacca muslin being among the first cotton fabrics ever made. India was the center of the cotton industry for hundreds of years and still produces cotton in large quantities. It was from this country, in the 16th century, that cotton was brought to America. Although the United States was the last to take up cotton growing, for almost a hundred years it has exceeded all other countries in the production of this fiber, and at present it raises about three-fourths of the entire world's crop.

2. Classification.—The cotton plant, the botanical name of which is *gossypium*, is a member of the mallow family, its flowers closely resembling the hollyhock of our gardens. Numerous classifications have been made of its varieties, some authorities giving a large number, but the majority place all cotton in four classes, namely, herb cotton, *gossypium herbaceum;* shrub cotton, *gossypium hirsutum;* tree cotton, *gossypium arboreum;* and lintless cotton, *gossypium barbadense.* Growers and buyers of cotton, however, prefer to classify it according to its place of growth, their chief classes being Sea Island, Egyptian, Upland, Indian, and Peruvian. The characteristics of these classes are as follows:

3. Sea Island cotton is grown on the islands along the coast of the Carolinas, Georgia, and Florida. It has long, silky, fine fibers and is used for making the finest cotton thread, such as that utilized for laces, sewing thread, silk mixtures, and silk imitations.

4. Egyptian cotton ranges in color from white to brown, the brownish color being due to the coloring matter in the Nile. Its fiber is unusually long, from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches, and it is used to some extent in the manufacture of spool cotton. Its greatest use, however, is in the manufacture of fancy knit goods, such as the better grades of hosiery and underwear, it being next in value to Sea Island cotton.

5. Upland cotton is grown in the United States on the uplands of some of the South Atlantic States. It is a cotton that varies greatly according to the cultivation of the plant and the character of the soil in which it is grown. The fibers of this cotton range from $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches in length and form a source from which we obtain the bulk of our cotton for use as sheeting, gingham, calico, and similar materials.

6. India cotton is used for making very coarse yarns, such as those used in denims and drilling, as it is shorter and weaker than the American upland cotton. The United States uses very little India cotton; its greatest markets are Japan and European countries.

7. Peruvian and Brazilian cotton, or *South American cotton*, as it is sometimes called, has fibers of a harsh, wiry character, which make both of these varieties useful in the adulteration of wool. The fiber is about the same length as that of Egyptian cotton.

8. Growth of Plant.—Cotton is planted some time from March until May and matures from August until the frost comes, often as late as November or December. It is ready to pick as soon as the boll bursts open and shows its downy center. The picking is practically all done by hand, for although machines are sometimes used, they are not very satisfactory because they cannot distinguish between the ripe and unripe bolls and not all the bolls ripen at the same time. Each picker picks from 150 to 200 pounds of cotton a day.

9. Cotton Ginning.—After being picked, the cotton is taken to a *ginnery*, where the seeds are removed from the fiber by the *cotton gin*. This device, invented in 1793 by Eli Whitney, has played a very important part in the history of the cotton industry. Up to the time of its invention, the seeds and fiber were separated by hand, but this was a very slow process for no one was able to clean more than 6 pounds of cotton in a week. Now, with the modern gins in use, two men can remove the cotton from the wagon and attend six gins, which clean 24,000 pounds in a day.

The cotton gin consists of a series of saw-like teeth that draw the fiber of the cotton through holes too small to permit the seeds to pass. The lint is carried on by rollers, whereas the seeds are sent to the oil presses, these being frequently installed in the gin houses, where the seeds are pressed through special machinery and yield cotton-seed oil, the hulls being used for fuel and fertilizer.

10. Sorting, Baling, and Opening.—After cotton is ginned, it is generally made into bales of 500 pounds each and shipped to a manufacturing center. Owing to the difference in the length and the condition of the fiber, the cotton must first be graded. To do this, the bale is broken and the cotton is placed in a machine known as a *cotton opener*, which tears the cotton apart. With the fibers opened, they are sorted according to length and whiteness. Bale breaking and opening are not necessary operations if the cotton is hauled from the gin directly to the cotton mill and it is to be graded at once.

11. Carding, Combing, Drawing.—The cotton passes through several intermediate steps that prepare it for the *carding* process. By means of a machine containing a card and a comb, the action of which has been compared to that of a comb and brush on the hair, the fibers are cleaned of their impurities and laid approximately parallel. From the card, which delivers the cotton in the form of a sliver, it is run through the *combing machine*, if it is intended for very fine material. Otherwise, it goes straight to the *drawing frame*, which combines several slivers and draws them out so that they are the size of one. After going through the drawing frame several times, the fibers are sent to the *fly frames*, where they are drawn still smaller and twisted very slightly. Then the yarn is wound on bobbins.

12. Spinning.—The next step in cotton manufacture is spinning, which is usually done on an upright frame by the flyer or the ring system. A humid atmosphere is more satisfactory for cotton spinning than is a dry one. Consequently, England is more suitable for this work than America, although large quantities are spun in both the Southern and the New England States. The chief purpose of spinning is to unite and draw out the fibers and to twist them into yarn.

There is a difference between the spinning of yarn for warp and that for weft. Since the warp yarn must be stronger than the weft, longer fiber cotton with a harder twist is used for it. For the weft yarn, the short fiber is employed.

The invention of the cotton gin by Whitney made possible a large supply of cotton for spinning. Also, improvements in spinning wheels gave a great impetus to the industry. In fact, spinning was practically taken out of the home and made a problem for factories, where it has been kept ever since.

13. Dyeing.—As soon as the yarn is spun, it may be dyed at once, when it is known as "dyed in the yarn"; or it may be woven first and then dyed, when the material is called "dyed in the piece." Most of the cotton yarn is dyed before weaving. Sometimes, the yarn is bleached and mercerized before dyeing.

14. Weaving.—Before cotton cloth is woven, the warp threads are sized to increase their strength and to make them withstand the wear of the loom. The warp is then placed on a warp beam and each of the warp threads is drawn through its particular *heald*, or vertical wire containing an eye, in the harness and its space in the *reed*, or a heavy frame set close with straight wires, between which the warp threads pass. The reed presses the weft threads up close to the finished piece to make it firm and even. Two operators are required to thread a loom for the first time, but after it is once threaded, the ends of the old warp may be tied to the ends of the new with a weaver's knot and the new warp drawn through. The pattern to be followed in the weaving is, of course, worked out before the warp is threaded in the loom.

The principle of weaving is practically the same in all looms at the present time. The harnesses automatically raise and lower the warp threads and with each opening of the *shed*, which is the space between the warp threads, the shuttle flies through, leaving a

trail weft thread; then the harnesses raise another set of warp threads and the shuttle flies back. The majority of cotton weaves are plain, but twill weaves are seen in some materials, such as drilling and khaki.

15. Cotton Finishes.—The varied finishes given to cotton materials account for the large variety of cotton materials on the market. Nearly all cottons are sized to some extent, the kind of material used for sizing depending on the effect desired. Thus, organdie is sized to give it a very crisp appearance and percale is treated with mucilage or gum to give it a glossy finish.

16. By **calendering,** or putting the cloth between heated steel rolls and using warm dressings, a high luster may be obtained, as in the case of sateen. Mulls are softened by means of oils; cretonnes are treated with clay to give them a solid appearance.

17. Mercerization is a finish given to various cotton materials. It is done in either the yarn or the cloth, usually before bleaching, and consists in treating cotton under tension with a solution of caustic soda to provide a high luster. Unless the yarn or cloth is stretched very tight when treated with the soda, it shrinks both lengthwise and crosswise and takes on a crinkled appearance. At one time, this was the method used for maufacturing cotton crêpe.

18. Printing.—In cotton manufacture, printing is an important process. It consists in impressing, or stamping, a design on the surface of a woven fabric or on the warp threads before the weaving is begun. The designs in calico, percale, organdie, and many other figured cotton materials are produced by means of printing.

PURCHASING COTTON MATERIALS

TESTS FOR QUALITY

19. Before you buy cotton fabrics, there are several tests that you should make in order to determine their quality. Because of the comparative cheapness of cotton fiber, it is seldom adulterated, but an inferior grade of cotton is often made to appear heavier by the addition of dressing. To test a thin fabric for the presence of dressing, when making a purchase, simply hold it up to the light and examine it. In this position, the starch that it contains will

show between the threads. Or, rub the material in the hands to remove a part of the dressing and thus determine the firmness of the cloth. In the laundering process, such material loses both its weight and its firmness. So, if you wish to make the most convincing test for the presence of dressing, wash a sample of the material and compare it with the original piece.

20. Fastness to sunlight and washing is a very important quality of cotton material. To test for this, cover one end of a sample with a piece of cardboard or something else that will keep out light and expose the uncovered end to sunlight for several days. If the color remains unchanged, the fastness of the color to light is practically assured. Then wash the sample in a warm soap solution, repeating this process several times. If the color still remains intact, you may rest satisfied that it is fast.

Guaranteed, fast-color material is more expensive at the outset than materials which are not guaranteed, because of the special dyeing process required to produce fast colors. However, the additional expense is justified by the attractiveness of the material throughout its life.

21. Dark-colored materials that have not been properly dyed have a tendency, when worn, to crock and discolor other garments or the skin. To test for this condition, rub a sample of the material briskly on a white, unstarched cotton fabric. If the color in the dark material does not rub off with this treatment, you may feel quite certain that the dyeing was properly done.

22. In buying material that is desired for long service, examine its warp and weft threads. These should be in good proportion as to strength and firmness, for the unequal tension produced by threads that are too decidedly unlike will soon cause the material to split or wear. Besides considering the strength and firmness of the fabric, test its quality by untwisting one of its threads and noticing the length of the separate fibers. Long fibers, that is, from $\frac{1}{2}$ to $\frac{3}{4}$ inch, provide additional strength and have good wearing qualities.

TABLE OF COTTON MATERIALS

23. The materials, or fabrics, made from cotton are large in number and variety. In order that you may become familiar with most of them, all those in common use for home dressmaking are

given in Table I. In it the materials are listed in alphabetical order, and, in addition to a description of each, the names of the weaves, the usual widths, and the normal prices are mentioned. Also, in this table, as well as in the tables for linens, silks, and wools, trade names are omitted, except those which have become generally known through advertising, such as "flaxon," "Georgette," etc.

It is advisable to study these tables and refer to them as occasion demands. This information, together with the tests for materials, will, if you are inexperienced, assist you materially in purchasing materials. Not only will you quickly learn to buy intelligently, but you will have the assurance that you are not making mistakes about prices. In addition, this information will aid you in the selection of materials for garments.

TABLE I

COTTON MATERIALS

Name	Weave	Usual Width Inches	Price per Yard	Description
Batiste....	Plain	32 to 45	25c. to $1	A fine, light, semitransparent cloth made in white and a few colors. Used for lingerie dresses, blouses, and underwear; coarse weave used for lining.
Bobbinet..	Lace	45, 54, 72	50c.to$2.50	Machine-made netting woven to produce six-sided figures; commonly called *net*. Used for dresses and, in the firmer weaves, for linings, overdrapes, and window draperies.
Broadcloth	Plain	36	40c. to $1	A cloth of medium weight and firm texture. Used for shirts, blouses, dresses, and children's clothes. Especially good for boys' wash suits.
Buckram..	Plain	24	29c. to 75c.	Coarse, open-weave material, made stiff with glue sizing. Used in garments for stiffening. Chiefly used for millinery purposes.
Bunting...	Plain	18 to 36	12½c. up	Soft, open-weave fabric used for flags and decorating purposes. Also comes in wool.

NOTE.—The prices in this table are based on normal trade conditions.

Name	Weave	Usual Width Inches	Price per Yard	Description
Calico.....	Plain	24 and 27	10c. up	Closely woven, thin cloth, usually with figured designs printed on one side. Used for inexpensive dresses and aprons. Often called *cotton print.*
Cambric...	Plain	24 and 36	15c. to 50c.	Fine fabric with a glazed finish. Used for handkerchiefs, linings, and undergarments. *Kid-finish cambric* is narrower in width and cheaper in price.
Canton, or Cotton, flannel..	Twill	27	10c. to 50c.	Heavy cotton with long nap on the right side. Used for children's underwear, interlining, etc.
Canvas....	Plain	27 to 40	15c. to $1	A coarse, firm material. Used for stiffening coats, facings, etc.; also, for making mail bags, tents, and sails. There is also an open-weave canvas used in embroidery work known as *cross-stitch canvas.*
Challis....	Plain	24 and 36	19c. to $2	A fine fabric, both plain and figured. Used for inexpensive dresses and for comfortables.
Chambray.	Plain	27 and 32	15c. to $1	Light-weight material with colored warp and white filling. Used for dresses, aprons, and sunbonnets.
Cheesecloth	Plain	24 and 36	12½c. to 50c.	Thin, light-weight fabric. Used for wrapping cheese, butter, etc.; also, for dish towels and for window decorating. Colored cheesecloth is used for masquerade suits and dresses.
Chintz....	Plain	27 to 50	25c. to $5	Material similar to cretonne, usually glazed-finished.
Corduroy..	Pile	36	89c. to $5	A durable, ribbed fabric in white and colors. Expensive qualities have cotton warp and silk pile. Used mostly for outing suits, lounging robes, and children's coats.
Coutil.....	Twill	36 to 54	30c. to $5	A stout material, sometimes in figured weave, used for corsets, brassières, bed coverings, and draperies.

Name	Weave	Usual Width Inches	Price per Yard	Description
Crêpe.....	Plain	27, 32, 36	19c. to $2	A crinkled, light-weight fabric. Used for underwear, blouses, and dresses. Some grades have floral and Japanese designs. Used for kimonos and lingerie robes.
Cretonne..	Plain, Twill, Fancy	24 to 50	25c. to $12	A medium-heavy cloth, usually printed in floral and striped designs. Used for upholstery and draperies.
Crinoline..	Plain	27 and 36	19c. to 50c.	An open-weave fabric filled with sizing. Used in cuffs, belts coats, and hats for stiffening.
Damask...	Satin and Jacquard	36, 54, 64, and 72	75c. to $2.50	A figured fabric used for table linen and towels. See Damask, Table II.
Denim....	Twill	29, 32, 36	30c. to 50c.	Strong, durable fabric in plain colors. Used for overalls and for furniture and floor coverings.
Diaper....	Figure	18 to 36	20c. to 60c.	Soft fabric, generally made with small diamond or bird's-eye pattern; used for towels and undergarments.
Dimity....	Plain	27 and 36	19c. to $1	Corded or crossbar, light-weight material, plain and figured. Used for infants' garments, undergarments, aprons, and lingerie dresses.
Drilling...	Twill	32 to 36	25c. up	Coarse, firm cloth. Used for men's outing suits and for interlinings.
Duck.....	Plain	18, 27, 36, and 126	25c. to $5	A heavy-weight, highly finished fabric. Used for outing skirts and coats and for tents and awnings.
Flannelette	Plain	27 to 36	29c. to 59c.	A soft fabric with a slight nap. Comes in white and colors. Used for sleeping and baby garments and for kimonos.
Flaxon....	Plain	32, 36, 40	29c. to $1	A mercerized lawn of fine quality. Used for blouses, dresses, and lingerie. *Flaxon* is a trade name.
Gabardine.	Twill	36	25c. to $1.50	A stout material used chiefly for tailored dresses and skirts. See Gabardine, Table III.
Galatea...	Twill	27 to 36	35c. to 75c.	A heavy, firm material for boys' clothes, outing skirts, middy blouses, and dress-form coverings.

Name	Weave	Usual Width Inches	Price per Yard	Description
Gauze.....	Plain or Leno	36	10c. to 20c.	Loosely woven, flimsy material, but very strong because of the weave. Used as foundation for collars and yokes, but principally for bandages. See Gauze, Table IV.
Gingham..	Plain	27 to 40	15c.to$1.75	A firm material dyed in the yarn before weaving. Many combinations of warp and weft are made to form stripes and plaids. Used for dresses and aprons.
Grenadine.	Leno	27 to 36	25c. to $2	Loose-weave fabric, usually with satin stripes. Used for party dresses and for draperies. Also made in silk and wool.
Huckaback	Figure	18 to 36	20c. to 75c.	A rough-weave cotton toweling. See Huckaback, Table II.
India linon.	Plain	27 and 30	18c. to 75c.	A cotton lawn in imitation of linen. Name is applied to many qualities of lawn. Used for children's dresses, aprons, and fancy work.
Indian Head...	Plain	18 to 54	23c. to $1	A coarse, firm material used as a substitute for plain, heavy linen. Comes in white and fast colors. *Indian Head* is a trade name.
Khaki.....	Twill	29	25c. to 75c.	Dark tan cloth. Used for men's and boys' clothes, army uniforms, girls' and women's outing garments.
Kindergarten cloth.	Plain	32	25c. to 45c.	Stout, closely woven material with a smooth surface. Usually in stripes. Used for children's clothes.
Lawn.....	Plain	27 to 40	25c. to $1	Sheer fabric filled with starch or sizing. Used for dresses, aprons, and curtains.
Linene....	Plain	33 to 54	29c. to $1	A substitute for linen. Much like *Indian Head*, except that it is softer and has a smooth finish.
Long-cloth.	Plain	36	12½c. to $1	Closely woven, fine, bleached muslin. Used for underwear and infant's clothes.
Madras...	Plain	27 to 50	35c. to $1	Firmly woven material, usually having stripes, which may be woven in satin, basket, or fancy weaves.
Marquisette	Leno	40	25c. to 75c.	Soft, open weaves in fine and coarse qualities. Used for dresses and curtains. Coarser qualities identical with scrim.

Name	Weave	Usual Width Inches	Price per Yard	Description
Mull.....	Plain	27 to 40	35c. to $1	Very soft, sheer, light material in white and colors. Used for dress foundations, blouses, and for inexpensive party dresses. Firm qualities sold under trade names of *seco silk* and *silk muslin.*
Muslin....	Plain	36 to 90	19c.to$1.50	A firm and loose weave, bleached and unbleached. Unbleached often referred to as *raw muslin* or *domestic.* Used for undergarments where durability is desired and for sheets and pillow cases.
Nainsook..	Plain	36 to 40	20c. to $1	A light-weight, soft, bleached, muslin suitable for dainty lingerie and children's garments.
Organdie, or organdy.	Plain	36 to 45	25c. to $2	Very fine, sheer, crisp material, in white and colors. Used for dresses, flowers, collars, and cuffs. "Permanent-finish" organdie retains crispness after laundering.
Outing flannel..	Plain	27 and 36	12½c.to40c.	Similar to flannelette, with a nap on both sides. Made in colors, stripes, and checks. Used for sleeping and infants' garments.
Percale....	Plain	36	17c. to 50c.	A close, firm fabric, plain and in colors. Used for dresses, shirts, and children's clothes.
Percaline..	Plain	36	35c. to 60c.	Closely woven fabric with glazed or watered finish. Used for linings and for drop skirts.
Piqué.....	Cord	27 to 36	25c. to $1	A firm fabric in lengthwise corded effect. Used for dresses, vests, trimmings, and coats.
Poplin....	Plain	27 to 40	19c. to $1	Fabric having fine crosswise ribs. Used for draperies, dresses, and children's coats. Also made in silk and wool.
Rep.....	Plain	27 to 50	25c.to$1.50	Firm material woven with heavier weft than warp, giving it a ribbed effect. Used for draperies, dresses, and children's coats.

Name	Weave	Usual Width Inches	Price per Yard	Description
Ratiné....	Plain	36 to 40	50c.to$2.50	Rough-surface fabric made with knotted yarn. Used for summer suits and sports dresses.
Sateen....	Satin	36	25c.to$1.25	Closely woven material, with lustrous, smooth finish, like that of satin. Used for dresses, underskirts, and linings. Heavy quality known as *surf satin.*
Scrim.....	Leno	24 to 60	29c. to $2	Open-mesh weave in white, cream, and ecru; light in weight and transparent. Used for curtains.
Seersucker.	Plain	24 to 36	25c. to 50c.	A thin fabric with an irregular, crimped surface. Used for dresses, coats, and underwear.
Silesia.....	Plain	36	30c. to 60c.	A light-weight fabric, similar to percaline; soon loses its luster. Used for linings.
Silkaline...	Plain	36	25c. to 55c.	A thin, soft, glazed fabric. Used for draperies and comfortables.
Soisette...	Plain	36	35c. to 75c.	Soft, mercerized fabric. Used for dresses, negligée shirts, and pajamas and sometimes for comfortables. *Soisette* is a trade name.
Swiss.....	Plain	32 to 44	25c. to $3	A soft dress muslin, usually in cross-bar and dotted effects. Used for dresses and curtains.
Tarlatan...	Plain	36 to 72	19c. to 59c.	Open-mesh, slightly stiffened fabric. Used for Christmas stockings, as a stiffening in garments, and for fancy costumes.
Terry cloth	Pile	20 to 40	15c.to$1.50	Cloth woven with a raised loop giving a rough surface. Used principally for towels, draperies, and bath robes.
Ticking...	Twill	32 and 36	25c.to$1.25	Firm fabric in stripes and in floral and herringbone patterns. Used for pillows and mattress covers.
Velveteen..	Pile	27 and 36	$1 to $5	A cotton velvet, with short, close pile. Used for dresses and children's wraps and for draperies.
Voile.....	Plain	36 to 44	25c.to$2.50	Material having hard-twisted, warp and weft threads woven in open mesh. Used for dresses, lingerie, and curtains.

LINENS

NATURE AND USES

1. Linen was probably the first textile woven by man, for it is known to have been in use centuries before the Christian era. And the treatment given to the fibers in these early linens was so excellent that napkins discovered in the wrappings of mummies were not only well preserved but were able to withstand several washings. The Phenicians are said to have carried linen production into Ireland, where it has always been an important industry, linens from Ireland being in great demand because of their beauty.

2. Linen has ever been regarded as the textile of luxury, for its rather high price, due to its methods of production, prevents it from being used as commonly as many of the other fabrics. It is used less frequently, also, because textile manufacturers have so perfected cotton materials, producing almost indescribable colors and weaves, that, whenever it is possible, cotton, which is much cheaper and does not wrinkle so easily, is substituted for linen. However, because of its sterling properties, there are some uses for which no substitute can be found for linen. This textile is practically free from lint, absorbs water very rapidly, gives up its moisture just as quickly, is easily cleansed, has exceptionally good endurance, can be had in the finest of fabrics, has threads that are smooth, strong, and lustrous, and is pure and hygienic for constant service. In addition, because of the length of its fiber, linen does not possess the fuzzy surface that characterizes cotton and that eventually results in a gray and dingy look through the constant accumulation of dust.

3. The cost of linen is well justified for household and surgical purposes, as well as for wearing apparel, handkerchiefs, neckwear, and fancy work. Because of its long history, its reliability, its purity, its expense in production, its exclusive use for many needs, linen should receive a respect which can hardly be accorded to any other fabric. And every effort ought to be exerted to prolong the life of a piece of linen to the fullest extent. Tablecloths, napkins, and other household linens should be laundered with the greatest care, as well as mended to make them last as long as possible. Housewives of today may well emulate the women of olden times, who spent more time caring for the treasures they had acquired and less time in procuring new things than we do.

PRODUCTION AND MANUFACTURE

4. Cultivation of Plant.—Linen is made from the fiber contained in the stalk of flax, an annual plant that may be produced in nearly all climates. Practically all European countries cultivate flax for the fiber, while India and the United States cultivate it for the seed and its products. When full grown, the flax plant, which has an erect, slight, and willowy stem, ranges from 20 to 40 inches high, and has small flowers that vary in color in the different varieties from pale yellow to bright blue. In the cultivation of flax, successive plantings are not made in the same ground, for it requires well-cultivated and well-nourished soil, an interval of from 5 to 10 years being allowed between flax plantings in Belgium. It is planted early in the spring, and as soon as it is a few inches high the women and children begin to weed the plants. In late July the harvesting begins, the flax being in the best state for fiber when the leaves and the stem of the lower part of the plant turn yellow and the seed pods begin to open. Instead of being cut, the flax plants are pulled up by the roots a handful at a time so as to save all of the precious, long fiber possible.

5. Removing Leaves and Seeds.—The manufacture of flax into linen consumes much time and, for the finer grades of linen, requires much hand work. After the flax is harvested, it is allowed to dry and the seeds are then removed from the stalks. Then the stalks are *rippled*, that is, they are separated from the leaves and any seeds that may still be attached by being drawn through a large iron comb.

6. Retting.—The next process through which the flax is put is called retting, the purpose of which is to separate the fiber from the bark and the woody core. It is accomplished by cold water, steam, dew, or in a chemical way, but the most satisfactory method for color and strength is by cold water. This is sometimes done in the neighboring streams, as in the river Lys in Belgium, this being one of the best known flax-raising districts in the world.

7. When the cold-water method is employed, the flax is put in open crates of wood, which are covered on the four sides with jute burlap, often from 2,000 to 3,000 pounds being put into one crate. The crates are covered with fresh straw, are floated in position in the stream, and then are weighted down with stones and sod until they are entirely covered with water. They are left in the water until the flax is sufficiently fermented, usually 14 or 15 days, the crate then rising above the water and bubbles appearing on the surface. Sometimes, for very fine fiber, the flax is removed from the water after 5 days, dried for a part of a day, and then put back for further action.

8. A different method is that practiced in Ireland, the flax being placed in stagnant pools of water. But the color of the linen is not so good when this kind of retting is done. In Russia, the fiber is left on the field to be retted by the dew. Retting is also done with the use of chemicals, but as these are apt to harm the fiber, this method is used less often than the natural ones.

9. Breaking and Scutching.—After being retted, the bundles are allowed to dry for a short time and are then turned inside out so that the air will reach all parts of the flax. As the fiber dries, it bleaches and becomes pretty well separated from the bark and woody pitch. It must be put through still more processes, known as breaking and scutching, or beating, before it is thoroughly cleaned of the particles of straw and dirt that cling to it. The linen *hackle* performs the service for linen that the card does for cotton in its manufacture; that is, it lays the fibers in order and removes all the short lengths of fiber that are known as *tow*, which is rescutched, spun like cotton, and used for coarse cloths. Sometimes the scutching is done by hand and sometimes by machine, but hand-scutching is considered less wearing on the linen.

10. Hackling and Drawing.—For very fine yarns, the fiber is sorted and cut into three divisions. The middle cut is the best and is known as *cut line*.

Before being spun, the fiber is combed many times and then put through a series of hackling machines to clean it more thoroughly and to separate the line from the tow. At the end of this treatment, the line is smooth, fine, and glossy. After being sorted and cut, it is again put into a machine and combed through fine wires, until it is made into a continuous ribbon or sliver. This process, which is called drawing, is repeated in other machines according to the fineness of the thread desired.

11. Spinning.—The spinning of the flax, which is the next process, is done by the wet, dry, or semidry method, depending on the purpose for which it is to be used. The tow is treated differently from the line, it being spun much like cotton. Dry-spun flax is more silky and has a greater firmness than that produced by wet spinning, but it is not so fine. The thread produced by wet spinning is twisted tighter and the flax is more subdivided, but these points are an advantage for certain classes of thread. Care must be used in wet spinning, however, to have the yarn dried quickly in order to avoid the forming of mold.

12. Sizing, Bleaching, Weaving.—With the spinning of the thread completed, it is usually sized to give it strength, and then it is often bleached wholly or partly before it is woven. The weaving, as can well be understood, depends on the purpose for which the linen is to be used. Sheetings, lawn, and cambrics are done in plain weaves, while towelings usually show twills. Damasks are generally woven on the Jacquard loom, and these cloths can be used on either side.

13. Finishing Processes.—The finishing of linen cloth does not vary greatly for the different weaves. After being woven, the web of cloth is bleached. *Chemical bleaching*, *dew bleaching*, and *grass bleaching* are in use. In Ireland, where grass bleaching is the method used, the cloths are spread out on large grass plots, where they become a snowy white upon being subjected to the rain and sunshine. In addition to being bleached, linen is often *washed*, *blued*, *starched*, and *mangled*.

14. *Dressing* is needed to some extent in even the best linens to bring out their designs. In poor grades, it is used to cover the defects of the linen. Different dressings are used to obtain different effects in the finished material.

15. *Beetling* gives linen its "leathery" feel. After the cloth is dampened, it is placed on a roll and is struck with a series of wooden mallets to give it the flat appearance that is so familiar to every one. The final processes include *calendering*, *pressing*, *inspecting*, *folding*, *marking*, and *packing*.

16. Countries Producing Linen.—The linens produced in the various countries seem to possess distinctive characteristics. Linen from Ireland has the distinction of being the purest white of all linens, and while it is not always showy, it possesses the best appearance and wearing qualities. The dazzling whiteness of Irish linen has been compared to new snow on which the sun is shining. These qualities are perhaps due to the climate in which the flax is raised, as well as to the method of bleaching, nearly all Irish linen being bleached on the grass, where it is subjected to sunshine and rain. Belfast, Ireland, is noted for its excellent wearing Irish linen.

In Scotland is produced linen that is much in favor, too, as it is usually sun- and grass-bleached, this method of bleaching being less injurious to the fibers than bleaching methods in which chemicals are employed. Scotch linens, as a rule, are much heavier and more showy in pattern than Irish linens.

The linen made in France is noted for its beautiful patterns, and especially is this true of French table linens. The French, as a rule, spin their linen thread round and fine with the result that they are able to produce some unique weaves and designs. Many linen dress fabrics are produced in France, too.

Belgium grows the finest flax of any country in the world, and the Belgians weave many beautiful linens as a result of having splendid material with which to work; also, they manufacture the finest linen threads used in lace making. It is said that the Belgians use more dressings in their linens than do the Irish.

The linen produced in Germany and Austria is silver white in color and very fine in texture and is produced in beautiful designs. Germany produces great quantities of unbleached table linen, also, which many prudent housewives buy and then bleach. The bleach-

ing is done by placing the muslin, every time it is washed, on the grass, where it is allowed to dry and at the same time is acted on by dew and sunshine.

The United States imports practically all its linen, and this fact accounts to a great extent for the seemingly high price of pure linen in America. In this country, the raising of flax has not reached a point to be profitable, except for the seeds and the making of linen thread and coarse linen toweling. America is recognized everywhere as the chief cotton-producing country, but Europe claims all honors in regard to linen fabrics.

Experiments in flax production, however, indicate that flax can be raised in the northwestern part of the United States. New York state, also, has produced flax from which linen has been woven.

PURCHASING LINENS

TESTS FOR LINEN

17. It is often a very difficult matter to distinguish between linens and fine cotton fabrics, especially when the cottons are slightly starched and ironed with a gloss. Consequently, much care should be exercised in the purchase of linens. Many authorities contend that only with a microscope or by means of certain chemical tests is it possible to distinguish linen from fine cotton. Of course, such tests are impossible to make when shopping; nevertheless, until the government passes laws that insist on pure, unadulterated cloth, certain precautions must be taken in buying linens. And there are a few tests that can readily be applied and that should be familiar to every housewife.

18. Because of the absorbing quality of linen, some kinds may be tested by pressing a dampened, or moistened, finger on the wrong side of the material. If the moisture is taken up quickly and shows through considerably, this is a fairly good indication that the material is linen. If the material is cotton, the frayed warp and weft threads will take up the moisture before it can penetrate the material. It takes an excellent cotton fabric to withstand a test of this kind.

19. Another test for linen that may be quickly made consists in pulling out a thread and jerking it in two. If the thread breaks easily and the ends appear fluffy or fuzzy, similar to cotton twine when it is broken, the material is cotton. If, though, the thread breaks hard and the ends show an uneven, drawn-out break caused by the flax threads, which form the strand of warp or weft, not being broken off abruptly, it is almost certain that the fabric is good linen. Pressing the material firmly between the thumb and forefinger will help to determine whether it is all linen or contains some cotton, for if it fuzzes up, it gives evidence of cotton.

20. A drop of glycerine on unsized linen makes it appear transparent, but does not have this effect on cotton. This is, therefore, a very good, as well as a very simple, test.

21. A test that may easily be made and that will aid in deciding definitely whether a given fabric is cotton or linen consists in placing a sample in a strong solution of washing soda. Both cotton and linen will shrink in this solution, but cotton will become a light gray, whereas linen will turn a faint yellow.

Another test is to drop the sample into a boiling solution of caustic potash, which may be purchased in any drug store, and let it remain there a few minutes. If it is linen, it will turn dark yellow, while if it is cotton it will remain nearly white or turn a light yellow.

22. The tests given for finding the amount of dressing in cotton can be followed to very good advantage when testing linen cloth, namely, holding the material up to the light or rubbing it in the hands. If the linen is colored, the tests given under cotton for exposing the material to the light and washing it may also be employed.

TABLE OF LINENS

23. Table II gives the name, the usual width, and the usual price per yard of all linens in general use. In connection with each kind of linen are also mentioned its nature and the purpose for which it is commonly used. As is true of similar tables of materials, this information will be of valuable assistance to all women in the selection of linens for garments and other purposes.

TABLE II

LINEN MATERIALS

Name	Weave	Usual Width Inches	Price per Yard	Description
Art linen..	Plain	18 to 45	69c. to $3	Smooth fabric with flat thread, for stenciling and embroidery.
Butcher's linen....	Plain	36	$1	A coarse, durable weave of long-fiber linen. Used for butchers' aprons, fancy work, dresses, and suits. Also made in cotton.
Cambric...	Plain	36 and 45	$1.25 to $5	Sheer, crisp fabric. Used for lingerie dresses and handkerchiefs.
Canvas....	Plain	18, 27, 32	30c. to $1.50	A coarse, firm material. Used as a body in tailored coats and sometimes in upholstery.
Crash....	Plain	36 and 45	65c. to $2	A coarse weave with even weft threads. Used for towels and fancy work.
Crash toweling		18	25c. up	
Damask...	Satin and Jacquard	15 to 108	$2.50 to $15	Firm, glossy linen generally made in brocaded figures. Used for towels and table linen.
Diaper....	Figure	18 to 36	40c. up	See Diaper, Table I.
Dress linen	Plain	16, 18, 22, 36, 45	50c. to $5	A plain, firmly woven material in either white or colors. Used for blouses, dresses, and towels.
Glass toweling	Plain	16 and 24	15c. to 60c.	A soft, fine, loosely woven material, usually having blue or red stripes or checks. Used for towels.
Handkerchief linen	Plain	36 and 45	$1 to $5	A sheer, fine, fabric; launders well. Generally made of Irish linen. Used for handkerchiefs, neckwear, blouses, and dresses.
Holland...	Plain	32 to 60	$1 to $2	Coarse, firm weave. Used for window shades and in photography.
Huckaback	Figure	15 to 27	75c. to $3	Weft threads prominent; warp threads often of cotton. Used for towels and fancy work.
Lawn.....	Plain	36	50c. to $1	Fine, sheer fabric made of short linen fibers. Used for handkerchiefs and baby clothes.
Round-thread linen....	Plain	18 to 54	$1 to $4	Soft-finished material, made with round, hard-twisted yarn. Suitable for drawn work, hand hemstitching, and hardanger work.
Sheeting...	Plain	36 to 108	$1 to $10	Used for pillow cases, sheets, towels, wash dresses, and suits.

WOOL

WOOL PRODUCTION

1. Origin.—Wool is the soft, hairy covering of sheep and certain allied animals, clipped from the animal and manufactured into fabrics of various kinds. Whether it was first produced by the Egyptians or the Greeks is a question of doubt, but it is sufficient to know that the sheep has been a domesticated animal from prehistoric times, for its bones have been found with those of human beings in ancient tombs. All down through the ages, to the time when cotton manufacture became an important industry, wool was the leading staple of commerce, figuring conspicuously in the prosperity of many nations. Now, it follows cotton in importance among textiles, but its production and manufacture are still leading industries in various parts of the world.

2. Wool Supply.—The wool fiber varies greatly as to length and nature, some of it being short, soft, dull, and crimpy, and other varieties being long, silky, and lustrous. The merinos, which include the Spanish, the Saxony Electoral, and the French, or Rambouillet, are prominent among the short-fibered sheep, while the Leicester, Lincoln, Cotswold, Romney Marshes, and Devons are among the long-fibered producers.

Besides sheep, the llama, the alpaca, the angora goat, the Cashmere goat, and the camel are all sources of wool fiber, some of them producing inferior grades and others, as the Cashmere goat of the Himalaya Mountain regions, yielding the most expensive wool grown.

3. Australia, South America, and the United States have long been the leaders in wool production. Australia is noted for the

merino with its fine, short fiber; England is the chief producer of the long, lustrous wool; Russia produces coarse wools used in making carpets; the United States is known for producing a cross-bred sheep, which has a soft, strong fiber longer than the merino. Numerous other countries, including France, Germany, New Zealand, South Africa, and various parts of Asia, figure prominently in sheep raising for wool production.

The raising of sheep requires considerable care if fleece of the best quality is to be had. Sheep breeders work for a good, dense fleece that contains as few burrs and other impurities, such as dirt, dust, and straw, as possible. The shearing life of a sheep is about 5 years. Then, it is usually fattened and sold for mutton.

4. The variation in wool fiber, which runs from 2 to 20 inches, was formerly responsible for the two kinds of wool material produced—woolens and worsteds. The short, curly fibers, which contain many serrations, or scales, were used for woolens because they are inclined to pull up together when subjected to moist heat. It is just this shrinking quality that is needed in the making of such materials as broadcloth and flannel. The long fibers were used for the worsteds, which are made of tightly twisted yarn and consequently show the pattern of their weaving plainly, as in the case of serges, prunellas, and similar materials. Now, however, machinery has been devised that can comb the very shortest yarns, so the difference between woolens and worsteds has become a matter of the way in which the yarn is prepared.

WOOL MANUFACTURE

FIRST PROCESSES

5. The first step in the manufacture of wool into cloth is the removing of the fleece from the sheep. Formerly, this was all done by hand, but now much of the sheep shearing is done by power. Skilful handling of the animals is needed to prevent cutting or injuring them in the shearing.

The fleece is cut so that it is all left in one piece, a fleece averaging from 5 to 12 pounds, although the fleece from a heavy merino often runs as high as 30 pounds. These fleeces are tied securely

in a bundle and put into a large sack, which, after being packed full, is fastened securely and shipped to the market.

6. Sorting.—When the fleeces arrive at the mill, they are very dirty and greasy, and often contain burrs, straw, and even anthrax germs. The wool must first be sorted into its different grades by a worker known as a wool sorter. This is a very disagreeable task, but it is an extremely important one, for on it depends much of the beauty of the finished yarn. In separating the fleece, which is a hand process, the sorter places it in piles or bins according to its quality. From these, it goes to the cleaning machines, each process forming a part of a train of machines which prepare the wool for spinning.

7. Dusting.—Very often wool contains so many impurities that it must be relieved of some of them before it can be washed. In some mills, it is put through the duster, which opens the fleece by means of coarse teeth, or spikes, and then removes much of the dirt by means of a fan.

8. Scouring.—When the fleece is taken from the sheep, it contains a greasy substance, known as *yolk*, which is caused by the animal secretions and the perspiration of the skin. The removal of the yolk is accomplished by the scouring process, which consists in putting the wool through various baths of warm water and certain chemicals, such as potash, ammonium carbonate, and soda, each mill having its own formula for the desired results. Much care must be used in scouring or the fiber may be harmed. From the last bath, it comes out thoroughly rinsed and then, unless it is to be dyed wet, it is dried, first in a cylindrical container by means of a whirling motion, which drives out excess moisture, and then by being carried over hot pipes or by means of hot air.

9. Carbonizing.—When wool contains a great many burrs, it must be put through a process that removes these before it can be carded and spun. Carbonizing, which consists of treating the wool to a solution of sulphuric acid that is not strong enough to injure the fiber and yet will singe the vegetable matter, is considered the best method of removing the burrs. The wool is then rinsed in a solution of soda and water and finally baked until the vegetable matter is destroyed. To remove the dried vegetable material, the wool is dusted.

10. Blending.—With the wool relieved of its impurities, it is usually blended to produce a combination of colors or of varieties of fiber. This is a process that requires considerable experience, for the blender must understand the mixing of colors in order to produce the desired effects.

11. Oiling.—By this time, the wool has lost practically all of its natural oil and it must be reoiled in order to pass through the remaining processes easily. The oiling may be done by hand or the wool may be sprayed with machinery as it passes from one machine to another. Various oils are used for this purpose, chief among which are olive oil and tallow oil.

MANUFACTURE OF WOOLENS

12. After the oiling of the wool fiber, the processes for the manufacture of woolens and worsteds begin to differ. When wool fiber is intended for woolens, such as underwear, flannel, broadcloth, and similar materials, the processes through which it passes are fewer in number and of a simpler nature than when it is to be made into worsteds. This is due to the fact that, for woolens, the fibers need only be cleaned and mixed, whereas for worsteds they must also be combed sufficiently to make them lie entirely parallel.

13. Picking.—The fibers are usually in a rather entangled condition after scouring and drying, so they must be put through a machine that opens them and then mixes them in preparation for the next process. This is known as picking.

14. Carding.—The process of carding, which usually involves the use of three machines, is the most important one in the manufacture of woolens. The first machine is sometimes provided with an arrangement whereby the fiber is mixed, and it always contains some means of combing the wool into a fine, even feed, or sliver, so that it passes easily into the next machine. In the second card, the wool is often transformed into a wide sliver and then laid diagonally into the feed, which deposits it so that one layer is half over the other and still alongside of it. In the third machine, the wool is fed from the side of the sliver so that it becomes well mixed and is prevented from lying in the parallel rows that the teeth

of the card naturally produce. From the last card, the fiber is put through rub rolls and then wound on bobbins in a slightly twisted form ready for spinning, or it is sent to the drawing frames where it is further prepared to be spun.

15. Spinning.—The mule frame is generally employed for the spinning of woolen yarn because its intermittent motion makes it especially adapted to the twisting of soft, short yarns. In the spinning frame, the yarn is wound on bobbins ready to be woven.

16. Weaving.—If the yarn is to be dyed before weaving, it is first wound into skeins and then dyed. Either undyed or dyed, it is woven into materials of various kinds, including broadcloths, flannels, chinchillas, blankets, as well as numerous sorts of knitted and crocheted goods. The chief characteristic of woolen weaves is that they are soft and practically concealed.

17. Finishing Processes.—After woolen cloth is woven, it must be put through certain finishing processes before it is ready for the market. Fulling shrinks it and makes it appear more closely woven. Napping, which is done by a machine having wire-cloth rollers, raises the nap of the material. Then, it is often sheared if a smooth, glossy material, such as broadcloth, is desired. Pressing and calendering follow, after which the material is bolted and ready for the market.

MANUFACTURE OF WORSTEDS

18. The chief difference between woolens and worsteds is that in the making of worsted yarn the fibers must be combed to make them lie parallel before they are twisted into thread. This involves much more work and the yarn must be put through many more processes than for woolens, so worsteds are usually more expensive fabrics. They are characterized by a firm, even, close-twisted yarn and by weaves that are usually distinguishable, as in the case of serges.

19. Carding.—The process of carding, while it forms a part of the manufacture of all worsteds, is not so important as in woolens. For very long yarn, the fibers are put through only one carding process for the purpose of straightening the fibers in preparation for the comb. If a short yarn is to be used, it must be carded oftener.

20. Gilling.—The purpose of the gilling machines is to prepare the fibers for the combs. Often, a number of slivers are united and then they must be straightened and laid parallel so that they can be fed properly into the combing machine.

21. Combing.—The combing of the fiber is the most important step in worsted manufacture. The comb separates the fiber into the long, straight wool, which is called *tops*, and the short, curly wool called *noils*. The tops, which are the ones used for worsteds, are sent to another machine that lays the long fibers as nearly parallel as possible. The noils are removed and then either combined with pure wool for certain materials in the mill itself or sold to other manufacturers. When the wool leaves the combing and gilling machines, it is in the form of a good-sized sliver wound into a ball that can be easily unwound.

22. Drawing and Doubling.—The yarn must be considerably reduced in size to make it suitable for spinning, so it is put through the drawing and doubling machines. These processes are repeated as many times as necessary to make the sliver the right size. In some yarns, a slight twist is given to the wool at this time, but in many the twisting is not done until just before the spinning. The wool is next wound on bobbins.

23. Spinning.—In the spinning of worsted yarns, two methods are followed: the English and the French. The English system oils the wool before combing and consequently produces a smooth, lustrous, tightly twisted yarn. The French method uses very little oil and so is often called dry spinning. It uses a much shorter fiber than the English system and produces a soft, dull, loosely twisted yarn.

24. Finishing Processes.—From the spinning frames, the yarn comes on bobbins and is ready for dyeing, weaving, and sizing. If it is to be dyed before spinning, it is run off into skeins or hanks and then wound again after the dyeing. Sizing, which strengthens the yarn and which is done in the case of most single yarns, may be done either before or after weaving. As worsteds depend for their beauty on their weave, the weaving of them, as well as the finishing processes of napping, shearing, boiling, steaming, and pressing, differs somewhat from that of woolens and at the same time requires much care and skill.

PURCHASING WOOL MATERIALS

TESTS FOR WOOL

25. All wool fabrics should be carefully examined to see whether they are absolutely clean and free from signs of shop wear, such as faded lines on the outside folds, spots, dust streaks, or pulled thread. Such goods may often be bought at a lowered price and, if time is not at a premium, may be cleaned, sponged, and pressed so that they appear satisfactory.

The color of wool fabrics, also, should receive attention. Note whether they are dyed evenly and whether the color is such that it will withstand the sponging and pressing required in both the making and the renovating of the garment. It is always well to examine material by daylight or "daylight lamps" in considering its color.

26. Fiber Test.—Sometimes wool materials are adulterated by cheaper materials, such as shoddy, cotton, and the waste from silk and wool machines. If you wish to know whether a material is all wool, ravel a little of it and examine the fibers. You will find that wool fiber is kinky, whereas other fibers are usually straight. Then try breaking a thread. The wool fibers pull apart rather than break, whereas cotton fibers, upon breaking, have tufted, fuzzy ends.

27. Physical Condition.—Much can be told from the "feel" of a material. A pure-wool fabric feels soft to the touch, whereas a wool mixture feels harsh and stiff. It is true, of course, that worsteds are stiffer than woolens, but there is a vast difference between the "feel" of worsteds and that of a wool material containing cotton or other substitute. Every effort should be made to train the hand to recognize the "feel" of the best wool, for this ability comes chiefly through experience in handling materials.

28. Design and Weave.—In the selection of wool materials, the design and weave should be carefully examined. A good plan is to place the cloth between you and the light, for then the design can be seen to advantage and any imperfections it may contain can be easily detected.

29. The weave of woolen fabrics affects the wearing quality, the color, the construction, and the success of the finished garment itself. A close, twilled weave makes a firm, durable material, while loose, open weaves are apt to lose their shape and wear poorly. On the other hand, the close weaves, although they wear better and are less likely to catch on rough surfaces or sharp projections, become shiny rather quickly. Looseness of weave can be detected by pulling the material back and forth. If, when pulled apart, the threads separate easily and show daylight through them, you may consider the weave too loose to wear well.

Weakness in the material may be due to imperfections in weaving or to too great a difference between the strength of the warp and the weft threads. Exposing the material to the light or pressing it firmly with the thumb and the fingers will help to detect such weaknesses.

Crushing the material in the hands and rubbing it together will show, with a fair degree of accuracy, how the fabric will wear, for roughness of the surface will be brought out just as in wearing.

Materials having cords or ribs running one way are weaker than those in which the cords or ribs run in both directions, for if cords are to be brought out prominently one of the threads must be combined with threads that are finer and more loosely woven.

30. Test for Shoddy.—Until recent years, shoddy was looked down on because it was thought to be only waste thrown off in wool spinning. This, however, is a mistaken idea, for shoddy is in reality the shredded wool of old cloth reduced to short fibers for the purpose of being used again. A small amount of shoddy mixed with new wool is not a serious detriment, provided the shoddy is good, for some very splendid materials contain shoddy. The best shoddy is made from clippings of new cloth, such as those received from tailoring establishments, but discarded wool of other kinds is cleaned by manufacturing processes and then worked up again into actually serviceable materials.

The necessity for testing wool materials for shoddy is not that they should be avoided, but that their price be commensurate with the shoddy used. The distinguishing feature of shoddy is that it has very short fibers, so short that they cannot be combed. This is one of the ways by which it can be detected. Sometimes, shoddy is felted on the back of poor broadcloth to make it appear thick and

heavy. Whether or not this has been done can be determined by brushing the back of the material. If a dust is raised, the use of shoddy is a certainty.

An excessive amount of shoddy in material makes it less elastic than pure wool. So, examining a fabric to determine its elasticity is another test for shoddy.

TABLE OF WOOLS

31. Table III is given to help in the selection, purchase, and use of wool fabrics. As in the case of similar tables, the weave, the width, the usual price, and a brief description are given for each material mentioned. In reusing materials, especially wool fabrics, many women find uses not mentioned here, for this table, like the others, considers the appropriate uses of only new fabrics. These however, need not serve when economy must be taken into consideration.

TABLE III
WOOLS

Name	Weave	Usual Width Inches	Price per Yard	Description
Albatross..	Twill	32 to 45	75c., $1 to $2.50	Soft, loosely woven, crêpe-like material, sometimes made in fancy weaves. Closely related to nun's veiling. Used for shirred and draped dresses.
Alpaca....	Plain	36 to 54	65c. to $4	Strong, elastic fabric with the gloss of silk, and having fine cotton and wool-like hair filling. Used for men's summer suits, and for skirts and coat linings.
Armure....	Figure	36 to 45	$1 to $4	Similar to alpaca and used for the same purposes. Woven in bird's-eye and diamond effect, sometimes in two colors.
Astrakhan.	Pile	48 to 54	$4.50 to $15	A woolen or silk material in imitation of real astrakhan. Used for coats for men, women, and children; for caps, muffs, and scarfs.
Barathea..	Plain	48 to 56	$2 to $6	Fine, soft, close weave in pebble or broken-rib effect. Generally made with silk or cotton warp and worsted filling. Excellent for dresses and light-weight suits.

Name	Weave	Usual Width Inches	Price per Yard	Description
Batiste....	Plain	36 to 44	$1 to $3	Light-weight, all-wool material with even warp and weft in plain colors; sometimes called *tamise;* in very light-weight, called *chiffon batiste.* Used for women's and children's dresses.
Bedford cord....	Cord	36 to 54	$2.50 to $6	Material with lengthwise cords, that is, raised surface with plain stripes between; in cotton and wool. Used for tailored skirts and suits.
Bengaline..	Plain	36 to 54	$2 to $4	Firm, light-weight goods having silk warp and heavy woolen filling forming ribbed effect heavier than poplin. Also made in cotton and silk.
Bolivia cloth....	Pile	54	$4.50 to $11	A soft, all-wool material woven like velvet. Used for coats.
Bouclé....	Twill	40 to 54	$2 to $6	Medium-weight fabric having rough but soft surface produced by nub, or loop-yarn, filling. Used for coats.
Brilliantine	Plain	36 to 54	$1 to $4	Wiry, silk-wool fabric, similar to alpaca, but of higher luster; made from angora-goat hair. Used the same as alpaca. This is the fine weave of mohair.
Broadcloth	Twill	48 to 56	$2.50 to $6.50	Smooth, soft-finished, closely woven fabric with a nap. Generally popular for dresses, suits, and coats.
Brocade...	Jacquard	40 and 45	$2 to $8	Soft material woven with raised patterns. Used for dresses and wraps. Sometimes silk and wool.
Camel's hair.....	Plain	42 to 54	$4.50 to $10	A fabric with a hairy surface made entirely or partly of camel's hair. In cheaper grades, cow hair is used. Used for coats, overcoats, and horse blankets.
Cashmere..	Twill	36 and 45	$1 to $15	A soft fabric in beautiful shades and sometimes woven in figures, especially Paisley. Attractive for women's dresses and for children and infants' wear.

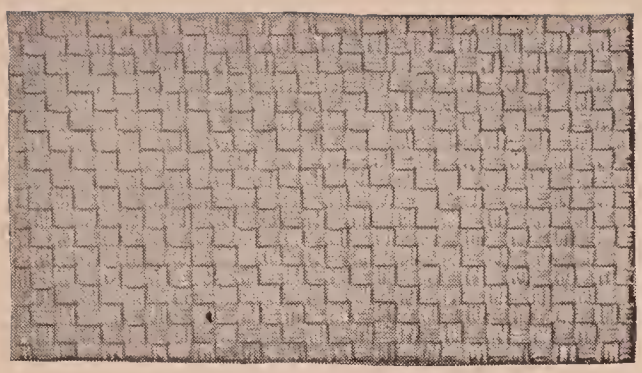
Name	Weave	Usual Width Inches	Price per Yard	Description
Challis....	Plain	27 to 36	$1 to $2	Light-weight, soft material. Has beautiful, plain, and printed color combinations; wears satisfactorily; and is easily cleaned. Excellent for dresses, negligées, and children's wear.
Charmeen.	Twill	54	$3.50 up	A very fine, closely woven material resembling Poiret twill, but finer. *Charmeen* is a trade name.
Cheviot...	Plain and Twill	36 to 54	$1.25 to $5.50	Material with slight nap; usually heavy-weight. Requires care in tailoring, especially in pressing. Used for suits and coats.
Chinchilla.	Pile	44 to 60	$3.50 to $7.50	Very fine, closely woven fabric in imitation of fur. Used for heavy coats and for men's overcoats.
Covert cloth....	Twill	44 and 54	$3 to $8	Smooth-finished material of firm, diagonal weave. Wears well and tailors nicely. Used for dresses, suits, and wraps.
Crêpe, wool	Plain	36 to 54	$1.75 to $5	Material having tightly twisted weft thread giving a crinkled effect; sometimes called *éponge*. Extensively used for dresses. Some crêpes come in silk and wool.
Doeskin...	Twill	40 to 48	$9 up	A compact, woolen fabric with a texture that is pliable without being flimsy. Used for gloves, skirts, coats, hats, wraps, and for linings in heavy fur coats.
Drap d'alma..	Twill	50 to 56	$3 to $6	Light-weight material of soft texture in ribbed effect. Used for dresses and suits.
Duvetyn..	Plain	18 to 54	$3.50 to $20	Soft, medium-weight material with a short, downy nap. Used for children's coats and women's suits and coats.
Eiderdown.	Knitted	27 to 44	$1 to $4	Soft, knitted foundation usually of cotton threads with a thick, soft, wool surface. Used for bathrobes, children's coats, and baby-carriage robes.
Épingle....	Plain	36 to 54	$1.50 to $5.50	Smooth, ribbed weave, the rib running across the material. Used for dresses and light suits.

Name	Weave	Usual Width Inches	Price per Yard	Description
Etamine...	Plain	40	$2.50	Light-weight, glossy, loosely woven fabric. Used for dresses.
Felt.....	Felted not woven	18 to 45	$3 to $10	A thick, firm-packed, smooth fabric. Used for hats, table covers, pennants, and cushions.
Flannel....	Plain and Twill	27 to 54	85c. to $8	Plain, soft, loosely woven material with warp and weft threads of equal size. Used for infants' clothes, women's wear, and men's shirts.
Gabardine.	Twill	46 to 54	$2 to $6.50	Firmly woven cloth in fine, diagonal-ribbed effect. Used for women's skirts, coats, and suits.
Georgette..	Plain	54	$2 to $4.50	A sheer fine fabric woven of firmly twisted threads to give a crêpe-like surface. Suitable for dressy frocks when the warmth of wool is desirable.
Granite....	Figure	36, 39, 54	$1.50 to $4	Hard-twisted woolen yarn woven in pebbled effect; light and durable. Used for dresses and suits. Requires care in tailoring. Some grades have a cotton warp.
Henrietta..	Twill	36 to 44	$1 to $4	A fabric similar to cashmere, but with a harder, coarser weave. Used the same as cashmere.
Homespun.	Plain	42 to 54	$2 up	A loose, rough material of plain weave and coarse, soft yarn. Formerly made on hand looms at home; now imitated by machine. Tailors well. Used for outing suits and men's clothes.
Hopsacking	Plain	50 and 54	$1.50 to $2.50	Rough-surface material, usually of coarse weave and similar to bagging. Used for coats and suits.
Jean.....	Twill and Plain	36 to 40	50c. to $3	A stout material made with hard cotton warp and a low-grade, wool filling. Used for work trousers, uniforms, and boys' suits.
Jersey cloth	Knitted	27 to 60	$2 to $4.50	Serviceable woolen or silk mixed material having elastic properties. Used for undergarments, petticoats, dresses, and suits. Comes frequently in tube form.

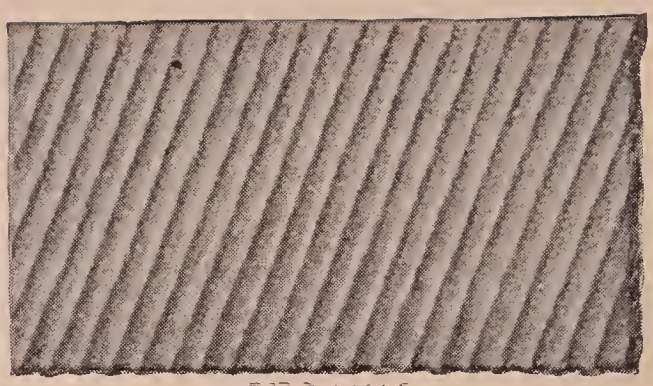
Name	Weave	Usual Width Inches	Price per Yard	Description
Karakul cloth....	Pile	48 and 50	$3.75 to $15	Made in imitation of Persian lamb-skin, which has short hair tightly curled to the body. Used for coats and for muffs and scarfs.
Kasha.....	Twill	54	$4.50 to $10.50	Considered the finest wool cloth made. Originated by Paul Rodier, French fabric designer and manufacturer. Made of camel's hair. Very soft and pliant. Does not become shiny with wear. Used for dresses and suits. *Kasha* is a trade name.
Kersey....	Twill	48 to 60	$4 to $10	A stout, heavy cloth with a close nap. Does not fray nor stretch easily. Used for suits, capes, and overcoats.
Lansdowne	Twill	36 to 40	$2.50 to $4	A very fine, wiry material made with silk warp and worsted filling. Used mostly for dresses.
Matelassé .	Figure	40 to 54	$2 to $10	Material having raised designs similar to quilting. Used for suits, coats, and trimmings. Also comes in silk.
Melton....	Plain	54	$4 to $10	Thick, heavy, short-nap material, finished without pressing or glossing. Usually in dark colors. Does not clean well. Used for outing suits and overcoats.
Merino....	Twill	36 and 45	$1 to $3.50	Thin, light-weight fabrics. Used for dresses and shawls.
Mistral....	Plain	40	$2.50 up	Twisted, warp and weft threads woven with nub yarn to give a crêpe effect. Used for dresses.
Mohair....	Plain	40 to 44	75c. to $4	A glossy, wiry material of which brilliantine and Sicilienne are varieties. Generally made with a cotton warp, for the hair filling slips in the weaving. Used for dresses, linings, and braid.
Nun's veiling.....	Plain	18 and 36 to 50	$1 to $5	Soft, light-weight fabric. Sometimes called *wool batiste;* coarser weaves called *nun's cloth.* Very satisfactory for shirred dresses.

Name	Weave	Usual Width Inches	Price per Yard	Description
Ottoman, wool....	Plain	36 to 54	$2 to $5	A firm fabric in ribbed effect. Used for coats and suits.
Panama...	Plain and Basket	36 and 40 to 54	$1 to $4	A light-weight, smooth-finished, wiry fabric made of hard-twisted yarn. Used for dresses and light-weight suits.
Poiret twill	Twill	40 to 54	$2.50 to $10	A firm, twilled, worsted having an appearance much like French serge except that its twill is more pronounced, as in gabardine. Used for dresses, suits, and coats.
Polo cloth.	Plain	54	$3 to $10	Double-faced, soft, and loosely woven, woolen cloth; it has an evenly cut nap. Used for coats.
Poplin....	Plain	36 to 54	$1.50 to $4	Medium-weight material having fine, crosswise ribs. Used for skirts and suits.
Prunella...	Twill and Satin	36 to 54	$1.50 to $5	A soft, fine, closely woven fabric. Used for dresses, light suits, and clergymen's robes. Satin-weave prunella used for shoe tops.
Ratiné....	Plain	40	$2.50 to $6	A loosely woven fabric, the weft threads of which are looped to give a rough, uneven weave. Used for dresses and suits.
Rep.....	Plain	36 to 44	$1 to $6.50	Firm material woven with a crosswise, corded effect. Used for dresses and suits, for men and boys' clothes, and for draperies.
Serge.....	Twill	36 to 56	75c. to $6	Soft, durable material that tailors well. Popular for suits, coats, and dresses. Also made in silk.
Serge, Cheviot.	Twill	36 to 54	75c. to $3.50	Fabric having a pronounced diagonal weave. Used for dresses and suits.
Serge, French..	Twill	36 to 56	$1.25 to $4.50	Very fine, soft weave; easily tailored; wears splendidly, but in wearing produces a shine more readily than other serges. Used for dresses and suits.
Serge, Storm...	Twill	36 to 54	75c. to $3.50	Hard, full fabric resembling cheviot. It is usually a coarser material than French serge.

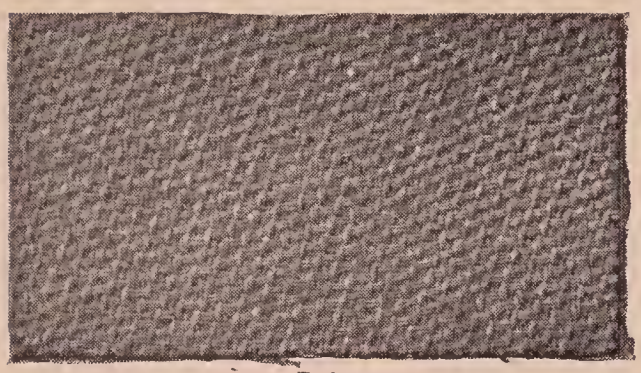
Name	Weave	Usual Width Inches	Price per Yard	Description
Sicilienne..	Plain	42 to 54	75c. to $4	Coarse weave of mohair. See Mohair.
Silvertone .	Plain	54	$2.50 to $10	A velour-like fabric having a limited quantity of real or artificial white silk mixed with the stock and producing a shimmering effect.
Soleil.....	Twill	40 to 54	$3 to $6	A smooth, highly finished fabric in ribbed effect. Used for dresses and light-weight suits.
Tartan....	Twill and Basket	36 to 54	75c. to $5	Soft cloth similar to serge but woven of different colors to produce checks and plaids. Sometimes in plain colors. Also made in basket weave in plaid designs. Used for dresses.
Tricotine..	Twill	48 to 54	$2.50 to $10	A soft, firm material showing a very narrow, inconspicuous, diagonal twill that gives a knitted effect.
Tussah....	Plain	40 to 50	$2.50 to $4.50	A light-weight, lustrous cloth used for dresses.
Tweed....	Plain	36 to 54	$2 to $8	Rough, unfinished, open texture, in homespun effect. Usually several shades are mixed, and the pattern is not defined. Very serviceable for suits and coats.
Velour....	Plain	18 to 54	$2.50 to $7	Soft, closely woven, smooth fabric. Used for suits, coats, and capes. Velour has a close-shorn nap.
Venetian..	Twill and Satin	54	$2.50 to $5	Fine, smooth fabric used for skirts and coats.
Whipcord..	Twill	36 to 54	$1.50 to $6.50	Material in raised, corded effect and semidiagonal weave. Cord varies in width from extremely narrow to $\frac{1}{8}$ inch. Used for dresses and suits.
Wool taffeta...	Plain	36 to 54	$1.25 to $3.50	Fabric having a closely woven, smooth weave. Similar to panama but of a much finer quality. Used for dresses and suits.
Zibeline...	Plain	44 to 56	$2 to $6	Material filled with glossy hair, which gives a $\frac{1}{8}$- to $\frac{1}{4}$-inch nap. Used for suits and overcoats.



BASKET

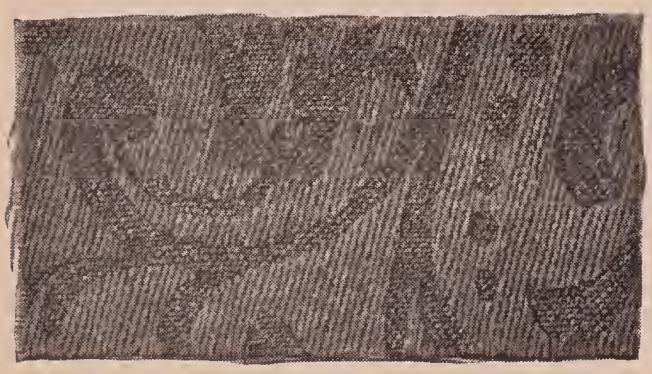


DIAGONAL

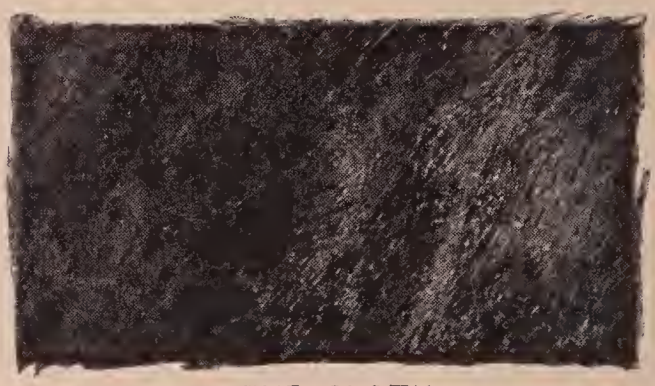


BIRD'S-EYE.

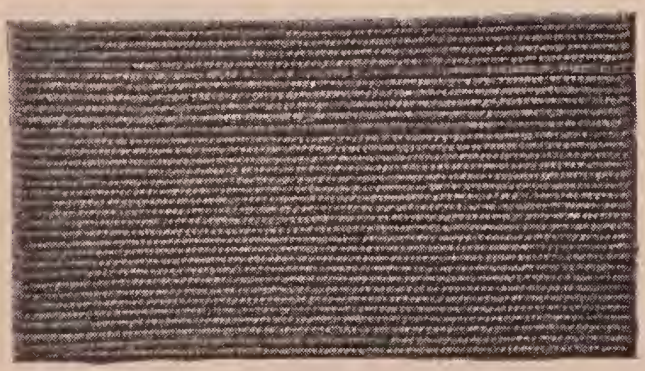
FELTED CLOTH



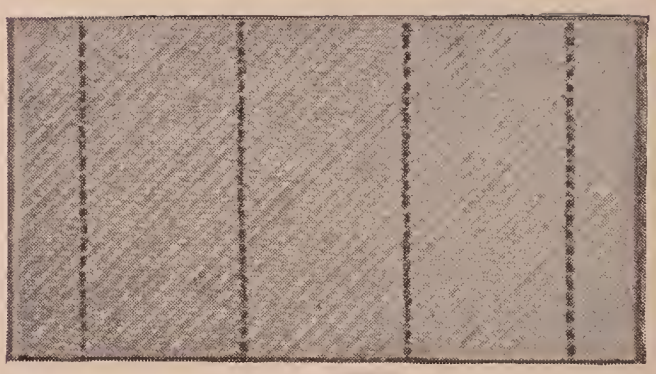
BROCADE



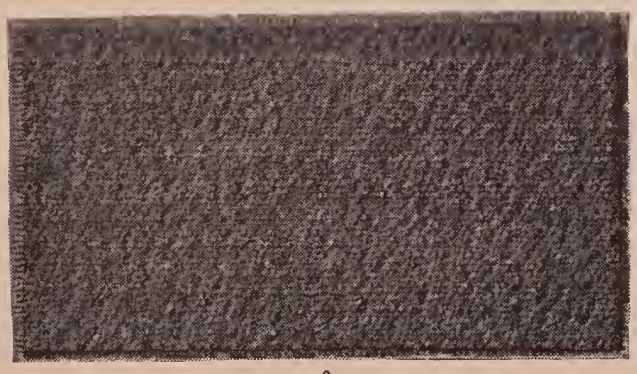
FUR CLOTH



CORD



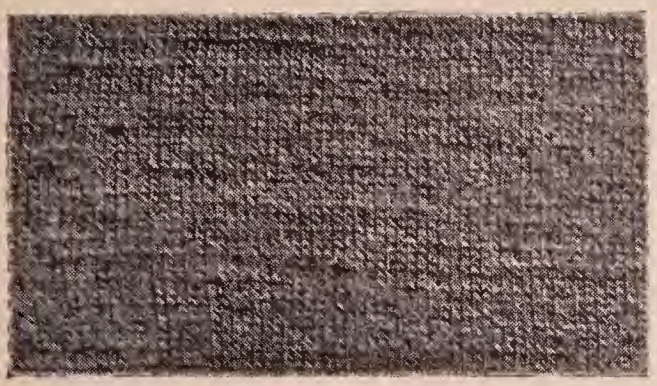
HAIRLINE



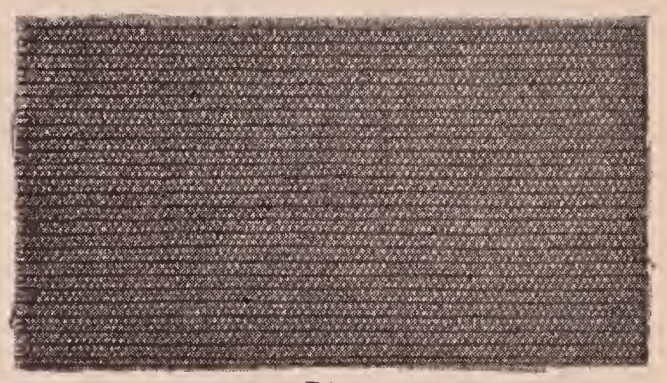
CRÊPE

HERRING BONE

Fig. 1

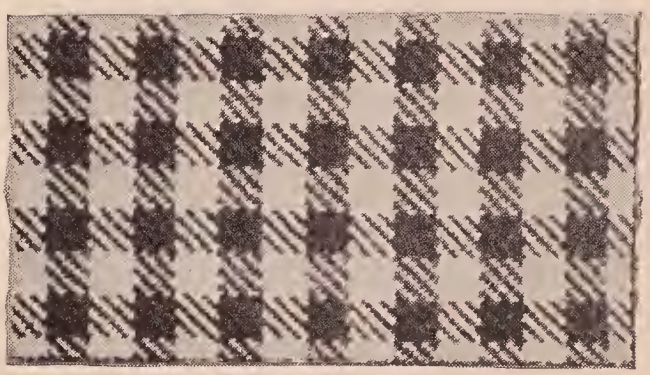


KNITTED CLOTH

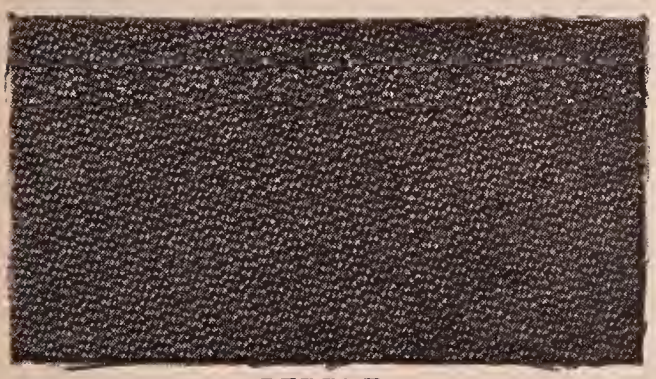


RIB

LOOPED SURFACE

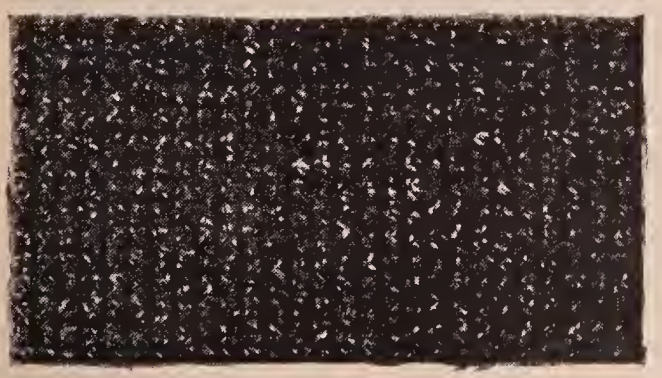


SHEPHERD'S CHECK

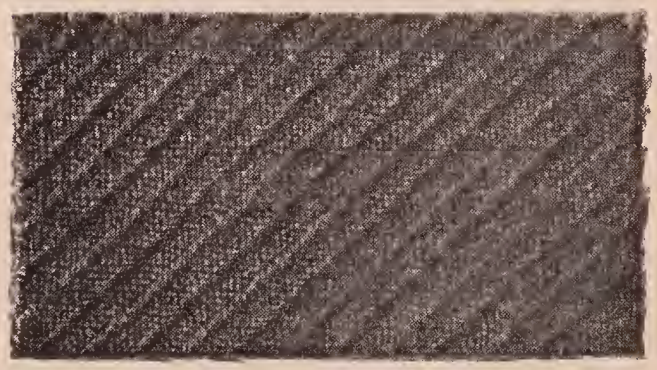


PEBBLE

TWILL

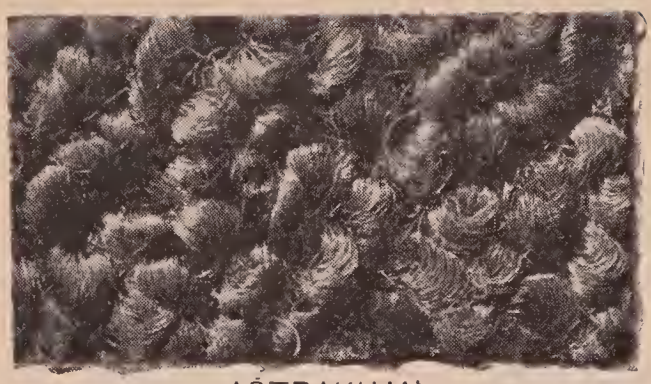


PEPPER AND SALT

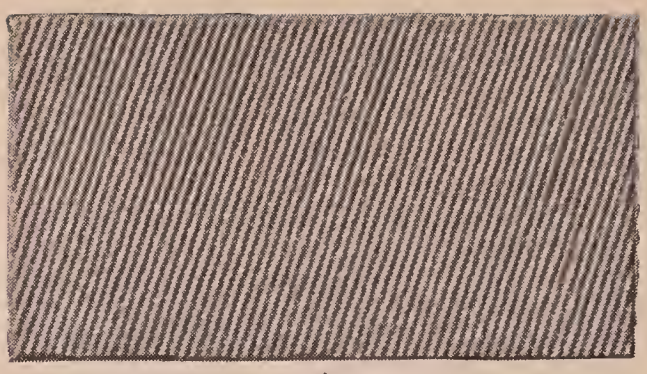


WIDE WALE

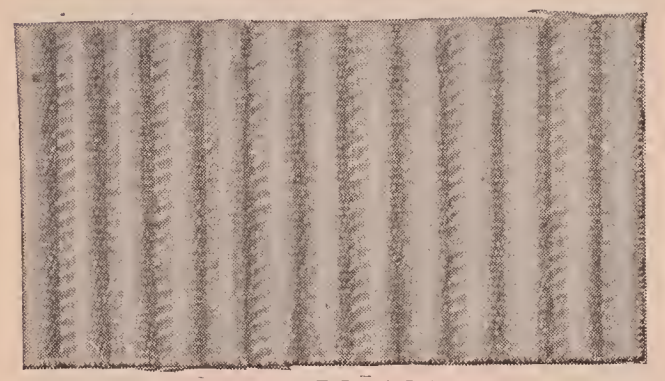
FIG. 2



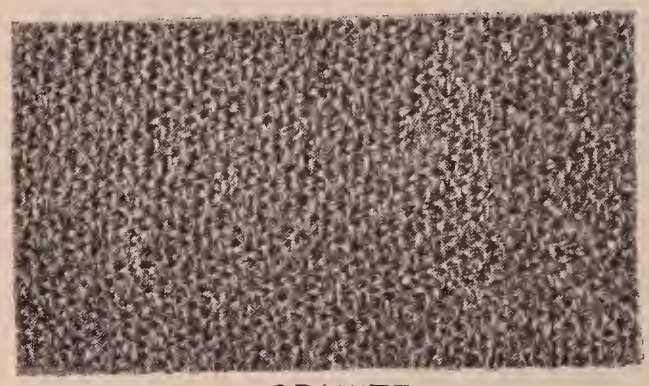
ASTRAKHAN



GABARDINE

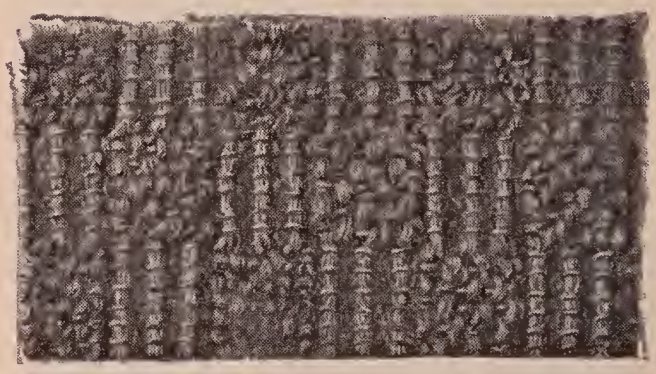


BEDFORD CORD

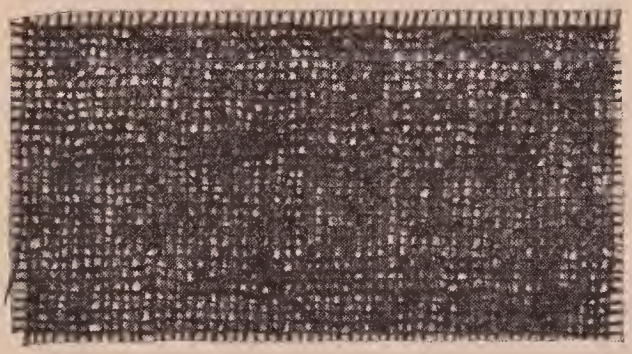


GRANITE

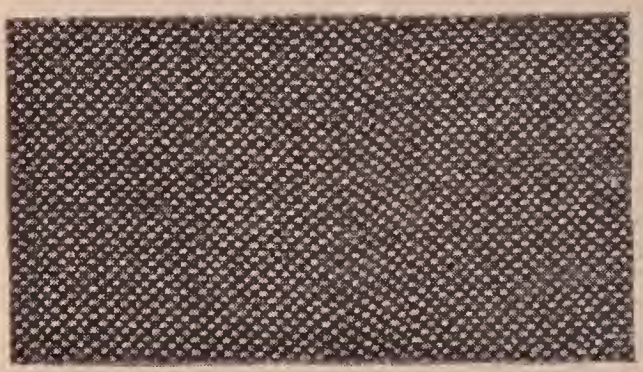
CHINCHILLA



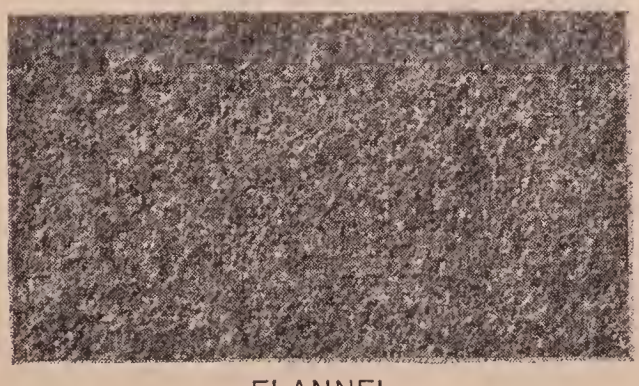
MATELASSE



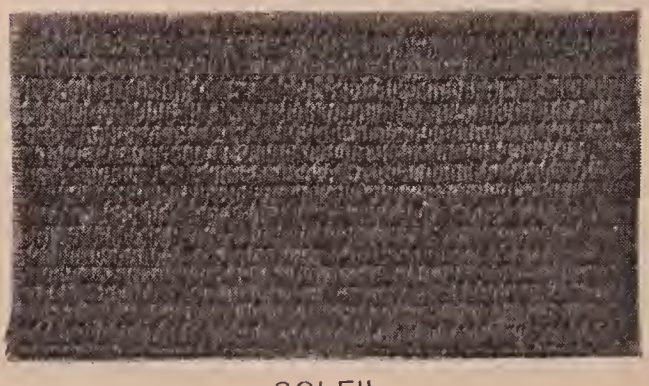
ETAMINE



MOHAIR



FLANNEL



SOLEIL

FIG. 3

EXAMPLES OF WOOLS

32. In presenting new materials each season, manufacturers often make use of certain features that have been popular in the past. They effect changes in materials by using softer or firmer yarns, by introducing nub, or knotted, yarn in weaving, by changing the width of the ribs or cords, and by varying a pebbled surface slightly. Such differences produce new fabrics that carry trade names. The most popular of these remain in demand long enough to become commonly known and eventually are adopted as standard fabrics.

As it requires some time for such materials to become standard and as novelty fabrics appear each year, which are bound to be

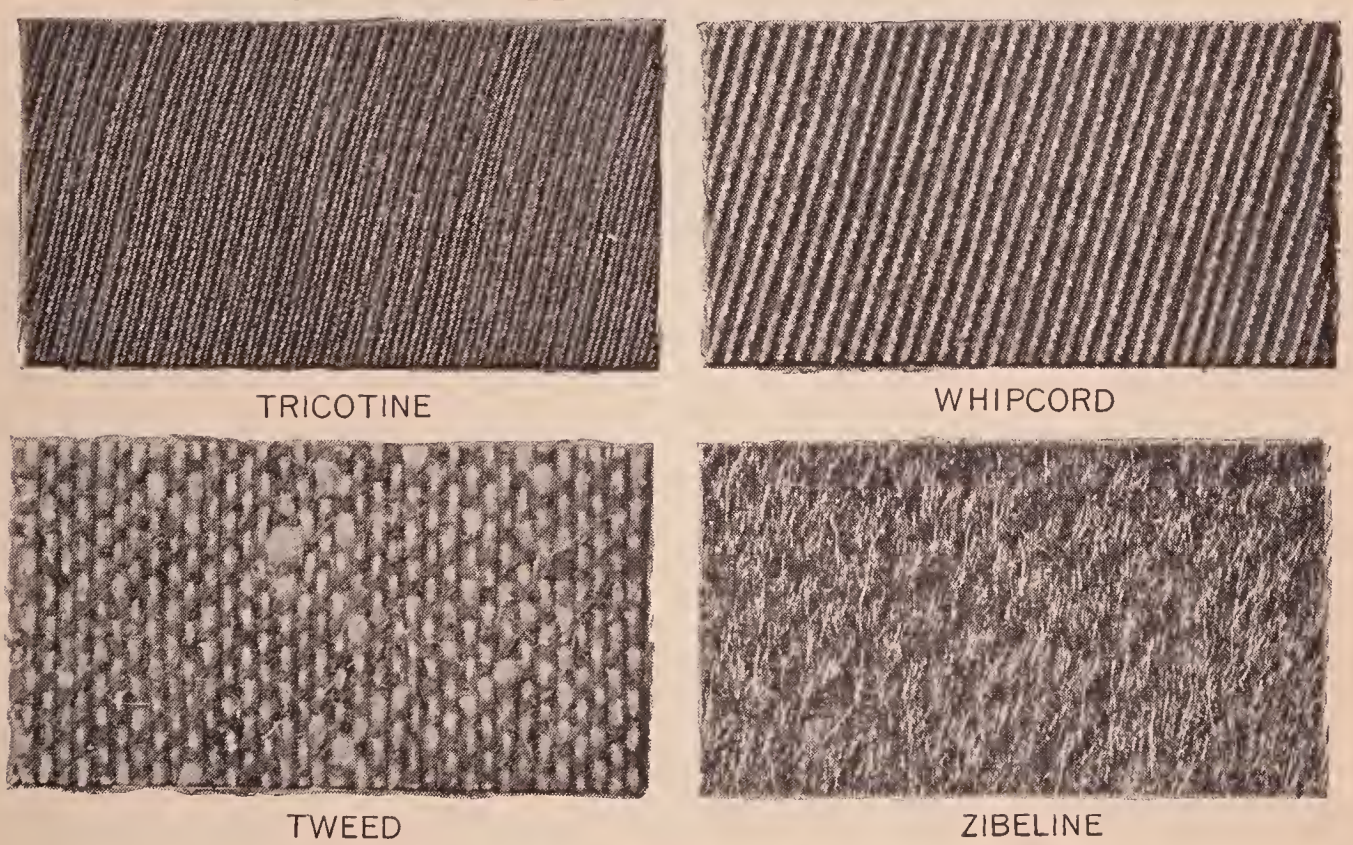
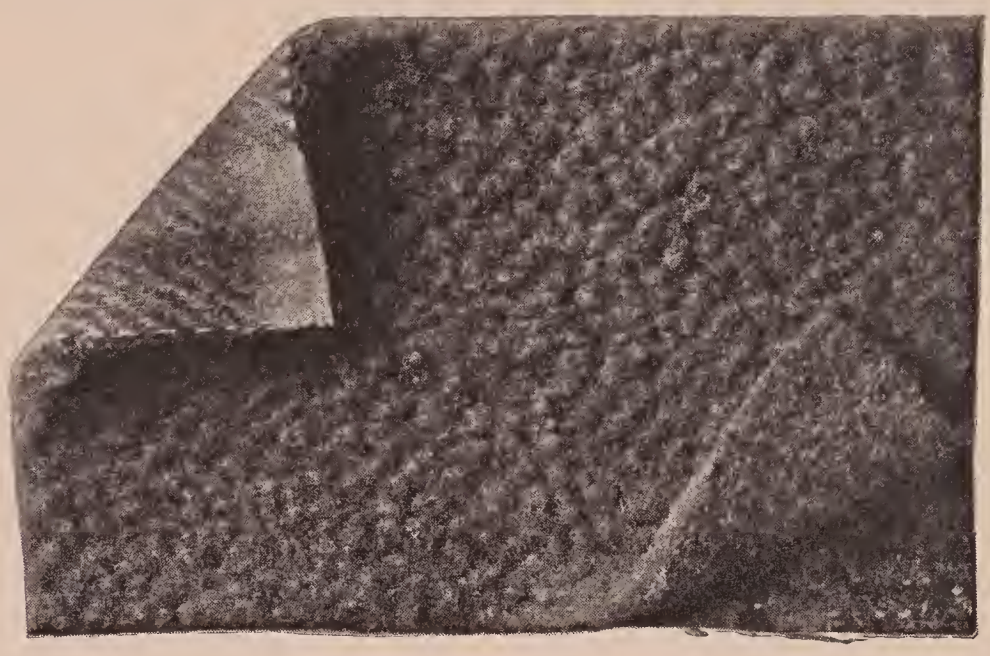


FIG. 4

short-lived because of their impracticability, it is sometimes necessary to group materials, as in Figs. 1 and 2, under names that represent effects, rather than to give the actual names of the materials. Such names may appear in various grades of fabrics and often cover cotton, silk, and wool materials, but they are a help in classifying materials and aid the shopper greatly in explaining to salespeople the kind of fabric desired.

33. Among woolen materials, there are certain standard fabrics having characteristics that distinguish them from all other goods.

The names of such materials are sometimes used in classifying new fabrics. Examples of the best known of these are shown in Figs. 3 and 4. A careful study of these illustrations not only will help to acquaint you with the appearance of these fabrics, but will enable you to classify new materials that have similar features.



DOUBLE-FACED CHINCHILLA

FIG. 5

34. The term *double-faced fabric* covers a variety of materials, many of them being produced in different effects. In Fig. 5 appears double-faced chinchilla, which shows the characteristics of all such goods.

35. *Novelty suiting* is a term applied to a variety of suiting materials that do not fall definitely under any other class. Originally the term referred to a fabric of plain, homespun weave with rough, irregular filling of different colors. The name is frequently applied to checks, brocades, and other unusual fabrics, regardless of the weave. Such materials are used chiefly for outing suits and coats.

36. *Water proofing* is a general term covering many different processes of rendering materials—cotton, silk, and wool especially —impervious to moisture. One of the best known and successful of these methods is known as cravenette, named for the inventor, a man called Craven. It consists in applying to the material a solution of secret formula which causes the fabric to repell water rather than absorb it. It has the advantage also of leaving the cloth porous by not filling up the spaces between the threads.

SILK

SILK CULTURE

1. Origin.—Because of its interesting history and the place it holds in the industrial world today, silk is a textile of the first rank and deserves unlimited attention. Just how it became known is a matter about which there is doubt, but tradition has it that the wife of one of the emperors of China discovered the possibilities of the silkworm in 2700 B. C. In addition to her discovery, she devised a method of reeling the silk and weaving it into cloth. For this work she was deified by the Chinese people and is still worshipped, after all these years, as "The Goddess of Silkworms." At the annual festival held in her honor, the feeding of the worms is an important feature of the ceremony.

2. Spread of Culture.—For hundreds of years, the source of supply of silk and the method of manufacturing it were kept secret in China. The material, however, was sold to the Persians, who, in turn, carried it to Southern Europe and sold it to the Greeks and afterwards to the Romans. The people who bought the silk believed it was made from fleeces growing on trees or from flowers, in accordance with the slender facts concerning cotton and flax.

During the reign of the Roman Emperor, Justinian, he commanded two Nestorian monks to go into China and return with the secret. Although in China it was a crime, punishable by death, to sell silkworm eggs or allow them to go out of the country, these two monks, while apparently engaged in their pious occupations, studied the whole industry and secreted several thousand eggs in their hollow staffs. These, together with a thorough knowledge of

the industry, they carried back to Rome, where, during Justinian's reign, the silk culture became a royal monopoly. Later, it spread into Greece, Sicily, Spain, France, and, in fact, over all of Southern Europe, where it still continues to be a thriving industry.

Attempts have been made to raise silkworms in America, but these have not been successful enough to indicate that their production will ever become a profitable industry. Silk manufacture from raw silk imported in large quantities from Europe and Asia is America's part in this great work.

3. Life History of Silkworm.—Silk is a substance formed by certain worms in great quantity at a particular time in their life history and secreted beneath the mouth from two long sacs along the inside of the body. The silkworm, which belongs to the family *Bombycidæ*, or spinners, exists in four states—egg, larva, chrysalis, and adult, or moth. The egg is very tiny, scarcely $\frac{1}{8}$ inch in length, and when first laid is yellow. The hatching, which takes place when the mulberry trees begin to leaf, requires about 10 days, the worm that emerges being black and no longer than its shell, and having sixteen legs. At first, the worms merely pierce the leaves of the mulberry and suck the sap, but very soon they become large enough to eat the leaves themselves. The worm holds the leaf with its three pairs of forward legs and cuts from the edge a piece to be eaten. This cutting causes only very slight noise in the case of a single worm, but sounds like the falling of rain when a large number of worms are feeding at the same time.

4. The skin molts four times because the worm grows so rapidly that the skin cannot keep pace with it. In the molting process, the worm stops eating, grows a little lighter in color, and fastens itself firmly to some object by its last five pairs of legs. Then it holds up its head and the front of its body for about two days. The skin breaks at the nose, permitting the head to emerge and the worm, by moving its body, to work off the old skin.

After the last molt, the worm is about $1\frac{1}{4}$ inches long, a wonderful growth considering the size of the worm when hatched; then it begins to spin its cocoon in a quiet corner, the glossy filament emerging from two orifices and thus making a double thread that hardens upon being exposed to air. The worm moves its head in the shape of a figure 8 in one part of the cocoon; then it moves to another section and spins in the same manner. Within a day's

time, the worm is out of sight, but the spinning continues from 2 to 5 days. The result is a fuzzy, oval ball about the size of a pigeon's egg. In three more days, the worm within the cocoon changes into a chrysalis, which in a few weeks changes again into a grayish-white moth that emerges from one end of the cocoon.

5. In a certain number of the cocoons, which are chosen as being perfect, the moths are allowed to come to maturity to be used for breeding purposes. As cocoons from which the moths are allowed to escape are pierced where the moth comes through, they are worth very little in the trade. So the large majority of cocoons are preserved intact by "stowing," or stifling, the moths within, that is, subjecting the cocoons to sufficient heat to kill the moths. They may then be kept indefinitely, or until it is possible to begin the reeling.

6. Wild Silk.—Silk is obtained from both the cultivated and the wild varieties of worms. Very great care is given to the rearing of worms that are to be used for making the very finest grades of silk. But there is also a large market for the silk obtained from the wild silkworms, which usually feed on oak leaves. Little attention is given to them, so they spin their cocoons in trees and similar places and the fiber is consequently of a darker, coarser, and rougher nature. *Tussah silk* is the chief variety of wild silk. The irregularity of the filament found in pongee is a characteristic of this sort of silk.

SILK MANUFACTURE

7. The second stage in the silk industry is the manufacture of silk, that is, the working of the fiber into thread and fabric. Removing the filament from the cocoon is not a difficult process, but it requires considerable care and skill. The cocoons are first soaked in boiling water to soften the gum that holds the fibers together.

8. Silk Reeling.—With the gum softened, the cocoons are immersed in fairly hot water, a few at a time, ready to be reeled, that is, unwound from the cocoon. It is in this way that the best silk is prepared. The reeling process consists in unwinding the cocoons and uniting the long, fine threads. So fine are the threads that several of them must be combined to form a thread strong enough to reel. The cocoons are so arranged in the basin that

the threads from four to eight cocoons are gathered together and as the reeling proceeds, are easily made into one thread, for the natural gum of the silk makes them stick together. If the reeling is done by hand or by foot power, the silk is called *re-reel silk*, but if power machinery is used, the silk is known as *filature silk*. There is much waste in this process, for neither the first nor the last threads can be used.

9. Doubling and Twisting.—After being reeled, the silk is skeined and sorted according to color, and then pressed into oblong packages called *books*. It is then wrapped and shipped to a manufacturing plant, where it must be sorted according to fineness. The skeins are soaked for 10 or 12 hours in warm soapsuds to remove as much of the natural gum as possible; then they are dried, the thread is wound on bobbins, and these are sent to the doubling machine. In the doubling process, which is known as *silk throwing*, threads from a number of bobbins are wound on one bobbin in order to make the thread stronger.

10. It is sent to the spinner next, where the threads that were brought together by the doubling process are twisted into one. The way in which the threads are twisted depends on the purpose for which the silk is to be used.

Single filaments of reeled silk that have not been twisted are called *singles*. If the silk receives only a slight twist in spinning, it is known as *tram*, but if it is tightly twisted, it is called *organzine*. Tram is used principally for filling, while organzine is used for warp.

11. Spun Silk.—In addition to reeled silk, which the long filament makes, the waste product is gathered and used for spun silk. For this, the short fibers taken from the outside of the cocoons, silk from imperfect cocoons or those from which the moth has escaped, and various other sorts of waste silk from reeling are collected, boiled to remove the gum, and then cut, combed, and spun in a way similar to cotton. Though of an inferior grade, spun silk has many uses, such as for knitted fabrics, for fancy effects in cotton and wool materials, and for embroidery and knitting silks.

12. Dyeing.—After being reeled or spun, the yarn must have all of the gum removed in preparation for dyeing. The greater part of the gum, of course, is removed in the first cleaning, but every particle of it must be extracted in order that the fiber may be

dyed smoothly and evenly. After the boiling-off of the gum, a lustrous, creamy-white fiber remains. Degumming takes away a great deal of the weight of the silk so that a certain percentage of weight must be added if it is desired to replace its original weight and thickness. In most piece-dyed silks, the materials are dyed and finished after the boiling process without being weighted. However, many silks are weighted by means of salts of tin, iron, and lead, particularly if they are dyed in the yarn. In the case of blacks, a large additional weight is often added. After the silk fiber is dyed, it is wound on bobbins preparatory to warping and weaving.

13. Weaving and Finishing Processes.—The weaving of silk does not differ greatly from that of the other fibers. The Jacquard loom is used extensively for the fancy brocades. Finally, the silk is put through the finishing processes, which consist of dressing, mangling, and calendering. Pure silk does not require dressing, it being finished by pressing alone. The silk and cotton materials and the poorer grades of silk are the ones that require both dressing and pressing.

14. Printing.—The printing of silks is an important part of the manufacture of this material. This is done either directly on the warp threads after the fabric has been woven, engraved copper rollers or blocks being used as in the case of cottons, or in the piece, when it may be done direct or by the discharge or the resist process. Stencils are used to a great extent by the people of Asia in their printing.

RAYON

DEVELOPMENT

15. Rayon has a unique position in the textile world in that it is the only man-made fiber. Because of its silk-like sheen and the fact that it resulted from early efforts to produce an artificial silk, it was long considered only a substitute or adulterant for silk, and was for many years called artificial silk. The recognition, however, that it is a distinct fiber, worthy of a place of its own along with the four natural fibers, came later and led to the coining of the name *rayon* in 1924.

The early rayons were shiny, having a harsh, metallic luster.

But this has been subdued so that they now appear almost identical with silk. And along with this improvement, has come a gain in strength. It is still true that some of them lose strength when wet, making careful laundering necessary, but they have been perfected to the degree that they can be both washed and dry cleaned successfully.

SOURCE AND MANUFACTURE

16. Source.—The source of rayon is cellulose, which is the structural part of all plants. Since cellulose can be obtained from either wood or cotton, it is evident that the production of rayon is not restricted by climate or season, so it has a great advantage over the natural fibers, which can be produced only in certain climates and during certain seasons.

17. Methods of Manufacture.—Although there are various methods of making rayon, the general principle is to dissolve the cellulose in chemicals and force the viscous liquid, thus formed, through fine holes in a continuous spray. A long, smooth filament, whose fineness is controlled by the size of the opening, comes from each hole and is hardened by contact with the air or another chemical, depending on the method in use, and a number of these filaments, or fibers, are twisted together to form a thread.

There are four commercially important methods of producing rayon, three of which, the viscose, nitro-cellulose, and cupra-ammonium, produce fibers that are very similar and are known as regenerated cellulose, because no chemical change is made in the cellulose during the process. The methods differ chiefly in the chemicals used. The fourth method changes the cellulose to an acetate cellulose with markedly different chemical and physical properties. The most commonly known of the acetate fibers is "celanese," which is a trade name.

ADVANTAGES AND DISADVANTAGES

18. Points in Favor of Rayon Fabrics.—In addition to its beauty and the fact that the price can be kept low because of the wide and continual availability of the raw material, rayon has other advantages over some of the natural fibers. An outstanding one is its fastness of color. In addition, white rayon remains white

always, without a tendency to become yellow or gray. Rayon is not affected, moreover, by the dyes used for other fabrics, with the exception of cotton, and this characteristic makes possible some very beautiful effects through cross-dyeing silk-and-rayon or wool-and-rayon mixtures.

Rayon is not injured by perspiration and is unfavorable to the growth of bacteria. Because of its smooth finish, it resists friction and so wears well.

19. Special Advantages of Regenerated Cellulose Fibers. The regenerated cellulose fibers absorb moisture readily, thus keeping the skin dry, permitting slow, steady evaporation, and preventing chill due to sudden drying. This type of rayon is a conductor of heat and so allows the body heat to pass out readily, making it a cool material for summer wear.

20. Special Advantages of Acetate Fibers.—The acetate rayons differ from the regenerated cellulose fibers in that they are heat conductors and so are about like silk in respect to warmth. These fibers are much harder than other rayons and do not absorb water readily. For this reason, they do not soil easily and are very little affected even by ink or fruit stains. They wash very well, and do not soften, shrink, nor stretch in the process. They dry quickly and do not wrinkle when worn or folded. Because they are not absorbent, some consider them undesirable for underwear. This objection, however, is outweighed by the fact that the health-giving, ultra-violet rays are said to pass through acetate fibers, giving them additional hygienic value. Still another point in their favor is their failure to absorb odors.

The acetate rayons have a softer luster than the other types, a more pleasing feeling in the hands, and, because they are more pliable, drape to better advantage.

21. Disadvantages of Rayon.—The chief disadvantage of rayons is that the smooth fibers are likely to slip and separate from one another in woven fabrics, particularly at the seams where there is strain, and to form runs quickly if a stitch of a knitted fabric is dropped. These disadvantages, however, are being overcome by special methods of knitting, by mixing with others fibers, and by roughening the surface of the fibers.

PURCHASING SILK

TESTS FOR SILK

22. To know the nature of silk is a valuable aid in silk selection. The quality of silk fabrics may be determined by pulling out threads from the warp and the weft and applying a lighted match to them. The way in which the sample burns indicates whether it is pure silk, weighted silk, artificial silk, or a cotton and silk mixture. If it is pure silk, the burning fiber will appear to melt, boil, form tiny bubbles along the burned edge, and give off an odor like burning hair or feathers. If the sample holds its original form more or less and simply glows when burned, you may be sure that the silk is weighted. Rayon burns with a quick flash and leaves no globular ash. If made of cotton, the fiber will flash up, then smolder and all but refuse to go out, giving off an odor like burning leaves.

23. Another test for silk is to crush it in the hand and rub a fingernail diagonally across it. If it crushes and wrinkles when squeezed in the hand or if the threads loosen or spread when the fingernail is drawn across it, it is not a good fabric to buy, for it will not give satisfactory wear.

Still another test for silk is to hold the goods up to the light to see whether or not it contains pinholes, which are generally caused by the action of metal salts used in the weighting of silk fabrics.

Because of the weighting process, the quality of fiber, and not the weight, should be of the first importance in the selection of silk.

24. A good test for velvet is to press the finger firmly on the nap. If it is all silk, the fibers will brush up and the finger prints will vanish; if it is cotton, the finger prints will show to some extent, no matter how much brushing is done.

TABLE OF SILKS

25. To assist in the purchase of silk materials and to afford a wider acquaintance with their kinds and uses, Table IV is given. Here, the names of the materials are arranged in alphabetical order, and with each one are given the weave, the width, the usual price, and a brief description. Constant reference to this table will help to acquaint you with the various kinds of silks and their characteristics.

TABLE IV

SILKS

Name	Weave	Usual Width Inches	Price per Yard	Description
Alpaca....	Plain	27 to 54	$1 to $3	A highly lustrous, smooth-surface silk. Slightly wiry. Used for dresses, coats, and suits.
Armure...	Figure	36 and 40	$2 to $5	A heavy, soft fabric with a semi-lustrous, pebbled surface. Used for hats and dresses.
Bengaline..	Plain	24 to 40	$1.25 to $10	A fabric in ribbed effect, heavier than poplin. Wool is used in the filling. Used for coats, suits, dresses, and trimmings.
Broadcloth	Plain	32 to 36	$1.25 to $3	A firmly woven silk, somewhat lustrous. Used for blouses, sports and children's dresses, and men's shirts.
Brocade...	Jacquard	36 and 40	$3.50 to $50	A fabric showing raised patterns of flowers; often enriched with gold and silver. Used as trimming and for evening gowns and wraps.
Canton crêpe....	Plain	40	$2 to $6.50	A highly finished material with fine silk or wool warp and heavier filling forming light cross-ribs. Heavier than crêpe de Chine. Used for dresses and wraps.
Charmeuse	Twill	36 and 40	$2 to $5	A soft, dull, satiny fabric. Used for dresses, especially draped dresses.
Chenille chiffon..	Plain and Pile	40	$8.50 to $13.50	A fabric of chiffon basis having floral and conventional motifs in pile weave, like velvet or chenille. Used for dresses and linings for evening wraps.
Chiffon....	Plain	40	$1.50	A very soft, flimsy, transparent material. Used for trimmings, overdrapes, and dresses and as a foundation under lace dresses.
Chiffon taffeta ..	Plain	36 and 40	$2 to $5	A light-weight taffeta of good quality, with a soft, lustrous finish. Used for fancy work, dresses, and suits.
China silk.	Plain	24 to 36	50c. to $3	A thin, transparent fabric with a luster. Used for linings, underwear, and sometimes for dresses.

Name	Weave	Usual Width Inches	Price per Yard	Description
Crape.....	Plain	18 to 40	$3.50 up	A thin, semitransparent fabric, finely crinkled, and having either irregular or long, parallel ridges. Black in this material is used extensively for mourning purposes.
Ciré.....	Satin	24 to 40	$3 to $6	Smooth, high-luster fabric with lacquer-like finish. Used for hats and dress trimming.
Crêpe de Chine.....	Plain	40	$1.50 to $3.50	Light-weight or medium-heavy, washable, all-silk fabric with untwisted warp, giving a lustrous, finely crinkled effect. Used for blouses, dresses, linings, and underwear.
Crêpe meteor..	Twill	40	$2.50 to $5	A lustrous silk crêpe with a fine-twilled face. Used for dresses.
Crêpe satin	Satin	40	$2.50 to $6	A two-faced fabric, one side satin, the other a dull crêpe surface. Made in different grades.
Faille.....	Plain	36 and 40	$2.50 to $6	A fabric having a light, crosswise grain or cord and a slight gloss. Used for suits, dresses, blouses, hats, and children's coats.
Flat crêpe.	Plain	40	$3 to $6.50	A firm fabric with lustrous, slightly crêpe-like surface. Pliant. Used for dresses and blouses.
Foulard...	Twill	36 and 40	$1.50 to $5	A soft, serviceable silk, plain and figured, for dresses and blouses.
Fur cloth..	Pile	48 to 50	$3.50 to $20	Deep-pile fabric made to resemble various kinds of fur. Tussah silk, silk fiber, and mohair are generally used in making it. Used for coats and trimmings.
Gauze.....	Leno	18 and 36	50c. to $3	Fine, transparent goods, flimsy but very strong. Used as backings to lend support and for over-draping and veils. Sometimes called *gossamer*.
Georgette crêpe ...	Plain	36 to 40	$1.50 to $5	Sheer material similar to chiffon, but woven of a more firmly twisted thread giving it a crêpe-like surface. Used for dresses, blouses, negligées.

Name	Weave	Usual Width Inches	Price per Yard	Description
Gloria.....	Twill	36 to 40	75c. to $4	A fine, closely woven fabric having a soft luster. The filling may be cotton or wool. Used for umbrellas and men's shirts.
Gold cloth.	Plain and Jacquard	18 and 40	$6.50 to $13.50	A shiny material made of metal warp and silk weft. Used for trimmings.
Gold tissue.	Plain and Jacquard	36	$1.50 to $7.50	Similar to gold cloth but soft and transparent. Used for overdraping and trimming.
Gros de Londres.	Plain	36 and 40	$2 to $4	Highly finished, pliable fabric having fine, flat ribs running crosswise. Used for dresses and hats.
Grosgrain..	Plain	18 to 40	$2 up	A stout, durable, corded silk; cords run from selvage to selvage; comes in colors. Used for coats and trimmings.
Habutaye..	Plain	27 to 54	$1 to $7	A fine, washable Japanese silk; smooth and even in texture. Used for summer dresses, blouses, skirts, and coats.
Japan silk.	Plain	36	75c. to $2.50	This name covers a variety of Jap silks; commonly applied to cheaper qualities of habutaye. Coarser weave than China silk. Used for blouses, summer dresses, and kimonos.
Khaiki....	Plain	36	75c. to $2	Fine, light-weight Jap silk. Used for dresses and scarfs.
Liberty satin....	Satin	36 and 40	$2 to $4	A very soft, closely woven material. Used for linings and trimmings.
Louisine...	Plain and Basket	36	$2 to $3.50	A plain, durable silk; soft glossy texture. Used for dresses, coat linings, and trimmings.
Madras....	Plain and Figure	32 to 40	$2 to $4	A durable wash silk, usually striped. Used for tailored blouses and men's negligée shirts.
Maline....	Lace	27	50c.	A soft, thin, perishable, gauzy fabric, similar to net in weave. Used for neckwear, trimmings, and as drapery for evening gowns. Sometimes called *tulle*.

Name	Weave	Usual Width Inches	Price per Yard	Description
Marquisette	Leno	40	$2.50 to $3	An open-mesh fabric, appearing much like voile. Used for over-drapes and evening gowns.
Messaline..	Satin	36	$1.75 to $3.50	A soft, closely woven, lustrous satin. Used for dresses, slips, and linings.
Moiré.....	Plain	24 to 40	$1.75 to $8.50	A watered effect produced on a ribbed fabric. Used for coats, dresses, suits, and trimmings.
Mousseline de soie..	Plain	45	50c. to $1.50	A transparent material. When slightly stiffened, it is called *pineapple cloth*. Used for collar foundations; similar to gauze.
Mull.....	Plain	27 to 49	50c. to $2	Very soft, sheer material. Used for foundations of dresses and blouses, and for inexpensive party dresses. Heavy quality called *Seco silk*, a trade name.
Ottoman..	Plain	40 to 44	$2 to $5	Thick, corded, lustrous silk. Used for wraps, dresses, and trimmings.
Peau de cygne...	Plain	36	$2 to $6	A fabric of soft, lustrous finish in pebbled effect. Used for dresses, suits, and coats.
Peau de soie	Plain	36	$2 to $6	A soft, durable fabric with dull, satiny finish, showing cross-ribs on one or both sides. Used for tailored dresses and trimming.
Persian or Paisley..	Satin and Plain	27, 36, 40	$2 to $20	A silk of many colors and designs. Used chiefly for dress ornament.
Plush.....	Pile	50	$3.50 to $20	A rich fabric with a pile face and a coarse, woven back. Plush pile is longer than that of velvet. Used for coats, capes, neck pieces, and muffs.
Pompadour or Dresden.....	Plain	36	$2 to $8	A flowered silk, usually taffeta; sometimes in rich colorings. Used for party dresses, linings, and fancy work.
Pongee....	Plain	33 and 34	$1 to $5	A plain, washable, light-weight fabric, having a slightly rough surface. Usually made of the natural raw silk. Used for summer suits, dresses, and blouses.

Name	Weave	Usual Width Inches	Price per Yard	Description
Poplin....	Plain	36 and 40	$2 to $5	A heavy warp fabric having well-pronounced crosswise cords due to heavy weft. Comes in many varieties. Satisfactory for suits, dresses, and children's coats.
Radium...	Plain	36 to 40	$1.50 to $3.50	A firm silk resembling silk broadcloth. Washable. Used for underwear and dresses.
Satin.....	Satin	36 and 40	$1.50 to $10	Firm, basic weave with a glossy, smooth luster on the face and a dull back. Comes in many varieties. Used for dresses, coats, linings.
Satin, Skinner's	Satin	36	$2.50 to $5	Heavy, durable satin with luster. Used chiefly for linings and dresses. This is a trade name.
Satin Wash...	Satin	36 and 40	$2 to $5	Soft, white, or light-colored satin used for collars and lingerie. It has the advantage of giving a good appearance after washing.
Shantung..	Plain	33 and 34	$1.25 to $5	A heavy pongee silk. Rough, plain, washable fabric. Used for dresses and blouses.
Silver cloth	Plain and Jacquard	18 to 40	$6.50 to $13.50	A shiny material made of metal warp and silk weft. Used for trimmings.
Silvertissue	Plain and Jacquard	18 to 40	$1.50 to $7.50	The cheaper grades are imitations of the metal cloths, and the more expensive ones are made of metal but are transparent.
Surah.....	Twill	36	$1.50 to $3	Soft, pliable fabric without dressing. Used for dresses and hats. *Satin surah* is a high-luster silk.
Taffeta....	Plain	36 and 40	$2 to $6	A fine, smooth, glossy fabric with considerable body; alike on both sides. May be plain, figured, striped, or plaid.
Tulle.....	Lace	72	$2	Fine, fluffy, machine-made net. Used for millinery, drapery on dresses, and party frocks.
Velvet....	Pile	18, 36, 45	$1.50 to $10	Has a short soft, thick-pile face and a plain back. May be all silk, or all cotton, or have a silk face. Used for dresses, suits, coats, hats, and trimmings.

Name	Weave	Usual Width Inches	Price per Yard	Description
Velvet, Chiffon..	Pile	40 to 54	$4.50 to $20	The lightest, softest velvet known. Used for elaborate dresses, suits, evening gowns, hats, and wraps.
Velvet, Croise...	Pile	18, 36, 45	$1.50 to $5	Has coarser back than Lyons velvet; so woven as to hold the pile firmly. Used for trimmings.
Velvet, Lyons...	Pile	18 to 36	$2 to $6	Velvet of finest quality, made in Lyons, France. Distinguished by the fact that the foundation material is visible through the pile. Silk or linen back only, never cotton. Either flat or erect pile.
Velvet, Mirror..	Pile	18	$1.50 to $5	A shimmery velvet, made of long, soft pile pressed in different directions. Used as trimming and for millinery purposes.
Velvet, Nacre...	Pile	18 to 36	$2 to $6	A velvet with a back of one color and a pile of one or two others, which gives a beautiful, changeable shading. Used for evening gowns and wraps, and as trimming, especially for millinery.
Velvet, Panne...	Pile	18, 36, 40	$1.50 to $7.50	Velvet having a soft pile pressed downwards in one direction. Used for gowns, wraps, and hats.
Velvet, Transparent...	Pile	40	$3.50 to $20	A fine, semi-transparent fabric of light weight, having a silk back and an erect rayon pile. Comes plain and printed. Used for formal daytime wear and evening dresses and wraps.
Vestings...	Figure	22 to 36	$2 to $10	Heavy, fancy materials usually in highly colored, Persian effects. Used for vests and trimmings, and for men's ties.
Voile.....	Plain	40	$2.50 to $3	Open-mesh, semitransparent silk or silk-and-wool goods. Used for overdrapes, evening dresses, and fancy blouses.

LACES

HISTORY OF LACE

1. From its very beginning, lace has been regarded as woman's treasure, and its production, as the fine art in which she has most excelled. Both old age and youth alike are conscious of its charm and beauty, realizing innately the power of this network of threads to enhance their appearance and provide a softening touch. And never has the value of the raw material entering into a product been so much increased by skill and industry and with so slight an expenditure of tools as is true of hand-made laces. Just consider, a little flaxen thread, a needle, a design drawn on a piece of parchment, plus the skill and infinite patience of a woman, and the result is a product almost beyond price—"a thing of beauty and a joy forever." Lace made by machine can never aspire to the distinction won by most of the hand-made varieties, but it is very often so dainty and so good an imitation that it not only demands our attention but arouses our respect and admiration.

2. While very few of us will ever have the privilege of possessing many, or perhaps any, pieces of good hand-made lace, we need not be deprived of knowing its characteristics, for there are excellent collections of these laces in the museums of art throughout the country, which are open to all for study and enjoyment. By examining these collections, or even by making a careful study of clear, distinct photographs of them, we may come to know the difference between a well and a badly designed piece of lace, whether hand- or machine-made.

It is all too true that the machine can not entirely give us the beauty and variety of texture we find in a needle-point or a bobbin-made ground or *toile;* still, we can learn to select the best pattern

available and also to distinguish the qualities in lace that give it enduring worth and make it a continual pleasure as long as it lasts.

3. Whether made by hand or by machinery, lace is an open-work fabric or network of linen, silk, cotton, or similar threads made with a needle or bobbins or by machinery and usually ornamented or figured. Most women know these facts regarding laces, but not every woman is familiar with the names of the laces, their wearing qualities, and the appropriateness of their design and weave to certain garments. It is the purpose of this Chapter, therefore, to give a brief history of the evolution of lace, to illustrate its various kinds, and to give an explanation of their distinguishing features and uses, so as to enable the woman unfamiliar with laces to gain a knowledge of them, and thus be in a position to select laces in an intelligent manner and to keep them in the best possible condition as long as they are useful.

By having a correct idea of the different weaves, their wearing qualities, and the purpose for which different laces are used, a woman will be able to recognize nearly any kind of lace when she sees it; and, aside from knowing what to select for her own use and how to help others, she will understand better the descriptions of gowns in fashion publications, which frequently contain excellent suggestions for the artistic use of laces of all widths and qualities.

4. Origin of Lace.—As the term is now understood, lace was first made and worn in the 16th century. The place of its origin has been much disputed, several different countries, notably Italy, France, Spain, Flanders, and even the far East, claiming the distinction. The frailness of the specimens that remain makes it somewhat difficult to trace the history of this beautiful fabric, but these, together with pictorial art and sculpture, have practically settled the question that to Italy belongs the honor, for it is definitely known that needle-point lace was made and worn there before 1500. Investigations indicate that bobbin, as well as needle-point lace, was made in Belgium by Barbara Uttman at about the same time. Lace derived its origin from netting, and not, as is often thought, from embroidery.

5. Growth of Lace Making.—At first, the lace-making industry was confined to the religious orders, it being made by both monks and nuns. Gradually, however, the nuns taught the art to

their pupils and in this way it spread among the other classes of people. Numerous countries, France, Spain, Belgium, Germany, and England, gradually took up the making of lace, each one producing certain varieties and becoming proficient in the making of them. Wherever lace has been produced, the industry has thrived at times and declined at others, the severity of the laws passed concerning it being largely responsible for this change. Therefore, while one would expect a story of continuous prosperity in so beautiful a craft as lace making, its development has been continually arrested and hampered. Consequently, while we like to think of lace as a simple, graceful, womanish fabric, it has often been influential in affecting the finances of a whole nation.

6. For many years, lace was made chiefly out of silk and linen thread, but in 1833 cotton thread was first substituted for flax. This produced a less artistic lace, but it afforded increased facility for the makers, as they found the cotton thread cheaper, more elastic, easier to handle, and less liable to break.

7. During the 19th century came also the invention of machinery for the making of net having a fast mesh, that is, one that would not unravel, for in 1809 John Heathcoat invented a machine that produced bobbinet. At first, only 1-inch strips, which had to be joined together, were made, but gradually machinery was perfected that would produce 18-, 30-, 36-, and 54-inch widths. With the introduction of machine net, all the traditions of lace making were upset, and by 1830 lace makers produced all kinds of simple motifs which they applied to net, thus demolishing the old methods of lace making and practically ending the history of old laces.

8. Another notable event in the history of machine-made lace was the application of the Jacquard attachment to the lace machine. This device had been used for the weaving of silk, cotton, and linen goods from the time of its perfection in 1803, but it was not until 1837 that it was successfully applied to lace making. From this time on, machines were able to duplicate practically every pattern of hand-made lace, so laces steadily grew in production and decreased in price.

9. Lace Making at Present.—After the first novelty of the machine-made lace had worn off, a slight reaction in favor of old lace set in both in England and on the continent. In France, laces

were cleaned, cut, and adapted to modern fashion. Thus, within the last half century, the taste for good lace has again become almost general in both England and France. The reason for such a reaction is not strange after all. While almost every description of lace is now made by machinery and produced so perfectly that it is often difficult for the practiced eye to detect the difference, still we can never overlook the fact that the finest and most artistic machine-made laces can never possess the intricacy of pattern nor the beauty of design that characterize laces made by hand.

10. In America, however, the hand-made lace industry has not progressed so well as in foreign countries, although in this country rapid strides have been made in the manufacture of lace by machinery. The reason for this should be clear. The intricacies of hand-made lace designs require long, tedious hours of labor, and as such work in Europe is done mostly by peasants, who work for very low wages, the cost of production is not so great there as it would be in America, where a higher standard of wages is the rule. In this day of commercial rush and competition, the time expended in making a bit of hand-made lace is hard to realize; yet, to see a piece of real hand-made Flemish lace without associating patience and labor with it would display lack of conception, for some of the designs made by the Belgians are marvelous so far as beauty and workmanship are concerned.

METHODS OF MAKING LACE

11. To understand thoroughly the varieties of lace and their uses, it will be necessary for one to become familiar with the principal ways in which it is made. As has already been explained, lace refers to ornamented open work of threads of flax, cotton, silk, gold, or silver, and occasionally hair or aloe fiber. These threads are looped, plaited, or twisted together in several ways, the method used determining the name to be applied to the lace as follows:

12. Hand-made lace, or lace made by hand with the needle and with bobbins. This includes:

1. Needle-point lace, or lace in which the threads are worked by hand with a needle.

2. Bobbin lace, or lace made with bobbins. This is made on a pillow, often being inaccurately described as pillow lace.

13. Machine-made lace, or lace made by machinery. Imitations of both needle-point and bobbin lace patterns are produced in machine-made lace. Machine-made lace is of two varieties, which are:

1. Woven lace, in which two sets of threads are used—warp and weft.
2. Embroidery lace, in which a pattern is embroidered on a ground, which is often burnt out afterward.

14. Needle-Point Lace.—In the true sense of the word, needle-point lace is made with the needle alone, although there are a number of laces to which the term "point" is applied that are combinations of both point and bobbin lace. It originated as an evolution of cut work and developed into net lace.

In the making of needle-point lace, the design is drawn on parchment, which is kept straight by being stitched to heavy linen. Threads are then laid along the lines of the pattern and sewed down through the linen and parchment. By means of fine stitching done with a needle and a single thread, the entire design, both the solid filling and the open work, is worked on the threads already laid, the button-hole stitch being generally employed.

15. Bobbin Lace.—The method of bobbin-lace making is an exceptionally interesting study and one of the most important in the field of hand-made lace. The lace is made on a pillow or cushion by twisting and plaiting threads wound on bobbins. It is sometimes called pillow lace, but this is not a distinctive title for it since needle-point and knotted laces are also supported on a pillow. The chief characteristic of bobbin lace, in addition to its being made with bobbins, is that the threads in it are plaited. In fact, it is the plaiting and twisting of the threads that help to characterize bobbin lace. At first, instead of pillow, bobbins, and pins, the hands were used, each finger serving as a peg. Occasionally, the hands of several assistants were required to furnish sufficient pegs for a broad border.

16. As with needle-point lace, the pattern is first drawn upon a piece of paper or parchment, which is then pricked with holes. The pricked pattern is placed on the cushion, which is sometimes

a circular pad backed with a flat board in order that it may be placed upon a table and easily moved as the worker may wish, and other times a well-stuffed short bolster, flat at both ends. On the upper part of the pattern are fastened the ends of the threads unwound from the bobbins, which thus hang across the pillow. These bobbins are thrown and twisted with regular precision in order to form the fabric of the ground and pattern. The wider such hand-made lace and the more intricate the pattern, the more bobbins are required to do the work; and as this work means the expenditure of much time and the exercise of skill, the price of such laces increases with the width and the intricacy of the design, the wider laces being more expensive in proportion to their width than the narrow ones.

17. Many bobbin laces are finished with *bead* edging, which consists of tiny buttonhole loops of thread edging the lace. This needle-point edge is, in effect, applied to many kinds of machine- and hand-made laces. It adds much to the attractiveness of a lace design, as it tends to impart the daintiness so much sought in laces. Bobbin lace finished in this manner is frequently referred to as needle-point lace. Bobbin-made lace has a fine, soft quality that distinguishes it from needle-point lace, which has a much harder and crisper appearance.

18. Woven Lace.—As early as 1560, efforts were made to invent machinery that would produce lace and thus take the place of the hand workers. William Lee, a weaver in Nottingham, England, struggled to produce a machine for this purpose, but his efforts met with opposition from the authorities because they considered machinery to be a detriment to the interests of the working classes. However, continued efforts by other inventors finally resulted in the production of the Heathcoat machine in 1809, which made successful net. John Leavers, of Nottingham, England, greatly improved this machine, and although it has had improvements since his day, it is still called by his name. The application of the Jacquard attachment has made it possible to duplicate the patterns of hand-made laces.

19. As the Leavers machine makes a woven lace, it requires two sets of threads, warp and weft threads. The warp threads are held in reels, while the weft threads are wound on flat bobbins

and run at right angles to the warp threads. The bobbins are made flat to allow them to pass between the warp threads and the two sets are twisted together by means of both a mechanism that controls the tension of either set of threads at will and an oscillating mechanism. As the tension on each set of threads can be made tight or loose, the slack threads on one are permitted to twist about the other as the pattern requires.

Nottingham, England, and Calais, Caudry, and Lyons, France, produce large quantities of woven laces.

20. Embroidery Lace.—The other variety of machine-made lace, which includes Plauen and St. Gall laces, is made on an embroidery machine called the Schiffli machine. The industry first started by the making of Oriental laces. Eventually, it was discovered that by using a ground of one material and an embroidery thread of another, the lace could be treated to an acid bath that would destroy the ground without affecting the pattern.

The Schiffli machine works on the same principle as the sewing machine, having two threads, one carried underneath on a bobbin and the other on top in a needle. The early machines were operated by hand, several needles being controlled by a pantograph, an instrument for reproducing the design, but later it was found possible to use a Jacquard attachment to reproduce the pattern and greatly increase the number of needles on the machine. Plauen in Saxony and St. Gall in Switzerland are the centers for the manufacture of this kind of lace.

VARIETIES OF LACE

LACE TERMS

21. In the subject of lace, as in most subjects, it will be found that there are many terms that are purely technical; that is, terms that pertain exclusively to this particular subject. These must be understood if a thorough understanding of laces would be had. To make them clear and at the same time enable you to take up the following examples of laces in the most intelligent manner, an explanation of the terms most frequently met with is here given, arranged in alphabetical order for easy reference.

A jours.—The filling or ornamental work introduced into enclosed spaces.

Appliqué.—Either needlework or bobbin lace in which the pattern is made separately and sewed onto a net ground.

Bead Edge.—Another name for beading, which is the simple heading on pillow lace.

Bobbins.—Small elongated reels, either wooden or bone, on which thread is wound for the purpose of lace-making. Often they are weighted with such articles as beads, coins, seeds, etc.

Brides, Brides Claires, and Bars.—Small strips used to connect the parts of a design and employed instead of a groundwork of net. They consist either of threads overcast with buttonhole stitches or of twisted or plaited threads.

Brides Ornees.—Brides ornamented with picots, loops, or pearls.

Cartisane.—A strip of parchment used to give a raised effect to the patterns in lace. It is covered with silk or gold or other metal thread. As it is not durable, the less it is used the more the lace is esteemed.

Continuous Inner Pearl.—A stitch used in Honiton and other braid laces to ornament the inner side of any leaf that is not filled with stitches.

Cordonnet.—The thread used to outline the designs in lace. Sometimes, it consists of a single thread, other times, of several threads worked together, and again, of a thread or horsehair overcast with buttonhole-stitches.

Couronnes.—The cordonnet is sometimes ornamented with stitches known as couronnes. The English form of this term is crowns.

Dentelé.—A French term meaning a scalloped border.

Engrêlure.—The edge of a lace by which it is sewed on the material it is to decorate. Same as heading or footing.

Entoilage.—The French term for a plain mesh ground.

Entre deux.—The French term for insertion, whether of embroidery or lace.

Fillings.—These are fancy stitches used to fill in enclosed spaces in needle-point and bobbin laces.

Fond.—The groundwork of needle-point or bobbin lace as distinguished from the pattern. Other names for it are champ, entoilage, reseau, and treille.

Gimp.—The pattern of lace which rests on the ground or is held together by brides. It is not the same, however, as the material gimp, which was formerly called guipure.

Grounds.—Two forms of ground are found in laces—the *bride* and the *reseau*. The bride ground consists of bars that connect the ornaments forming the pattern. The reseau ground is a net made either with the needle or with bobbins.

Guipure.—Formerly, a lace-like trimming of twisted threads. Now, it is applied to all laces having a tape-like pattern on them.

Insertion.—Strips of lace or embroidered muslin or cambric on which both edges are alike.

Jours.—Ornamental devices found in various parts of lace. In Venetian point lace, jours are introduced in the center of the flowers.

Mat or Math.—The closely worked portion of a lace; the toile.

Passement.—The pricked parchment pattern upon which both needle-point and bobbin laces are worked.

Pearls or Purls.—Bars or brides.

Pearl Edge or Purl Edge.—A narrow edge consisting of projecting loops and sewed to lace as a finish.

Picot.—Tiny loops worked on the edge of a bride or cordonnet or used to beautify a flower, as in the case of rose point.

Pillow Lace.—Bone lace, or bobbin lace, made on a pillow by twisting or plaiting the threads with bobbins.

Point Lace.—Properly, only lace made with the point of a needle, needle-point lace. However, the term is often misapplied, numerous laces, such as Point d'Angleterre and Honiton point being made with bobbins and not with the needle.

Point de Raccroc.—A stitch used to join reseau ground.

Point Plat.—A French term for flat point lace having no raised cordonnet or outline cord.

Pricker.—A short instrument with which holes are pricked in the pattern used for bobbin lace.

Reseau.—Ground of small, regular meshes made both on the pillow and with the needle.

Samplers.—Small samples showing patterns of lace. They originated in the 16th century when not every one could buy pattern books because of their scarcity and high price. They were also used to show the skill of the worker.

Sprig.—A detached piece of lace which is appliquéd to a net foundation or joined with other sprigs by means of bars.

Machine-Made Alençon
FIG. 1

Ties.—Like bars, ties are the connecting threads worked across spaces in needle-point and bobbin laces.

Toile.—The substance of the patterns of lace as distinct from the ground.

Treille.—Another name for the ground or reseau of lace as distinguished from the pattern which they surround.

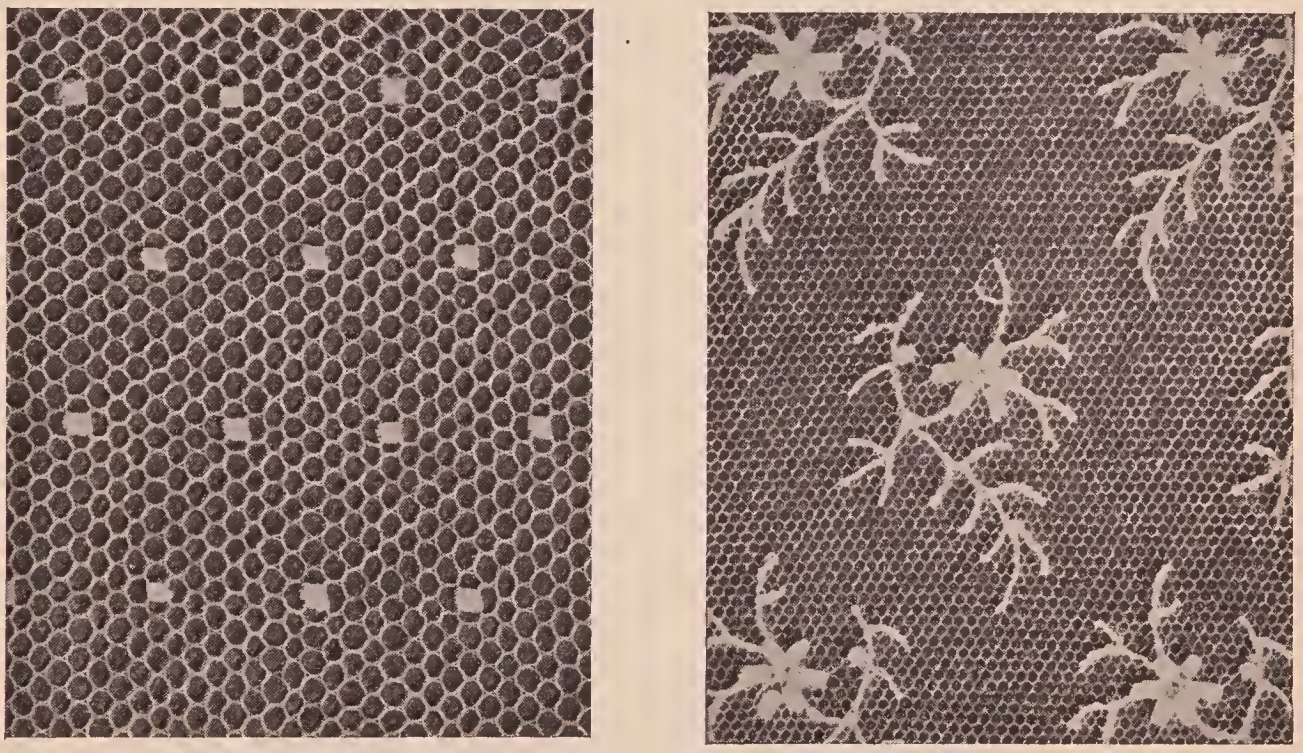
EXAMPLES OF TYPICAL LACES

22. Following are the names and descriptions of a large number of laces together with illustrations of many of them. Not all the laces in existence are included here, but practically all of the laces that are used by the woman who sews are discussed. With these illustrations and descriptions firmly fixed in the mind, no woman should be at a loss to recognize any kind of lace when she sees it; rather, she should be able to make proper selections for garments on which lace is to be used, and she should know whether it will give the service she desires of it.

23. In studying the laces here mentioned, it should be remembered that the manner in which they derive their names is by no means consistent. Many of them are named according to the locality in which they have been, or are, made, or the nation-

ality of the people who make them, as Antwerp lace, Brussels lace, Armenian lace, Bohemian lace, Belgian lace, and so on. The same kind of lace is made in many countries, but the threads of which it is made vary to some extent, owing to the process of manufacture of the thread itself in these different countries. Then, again, the implements used in the manufacture and the method of making have much to do with the naming of laces, as bobbin lace, point lace, and so on.

24. Alençon lace, often referred to as point d'Alençon, is a needle-point lace having a sheer net ground and a pattern that is outlined with a thread covered with buttonhole-stitches to produce



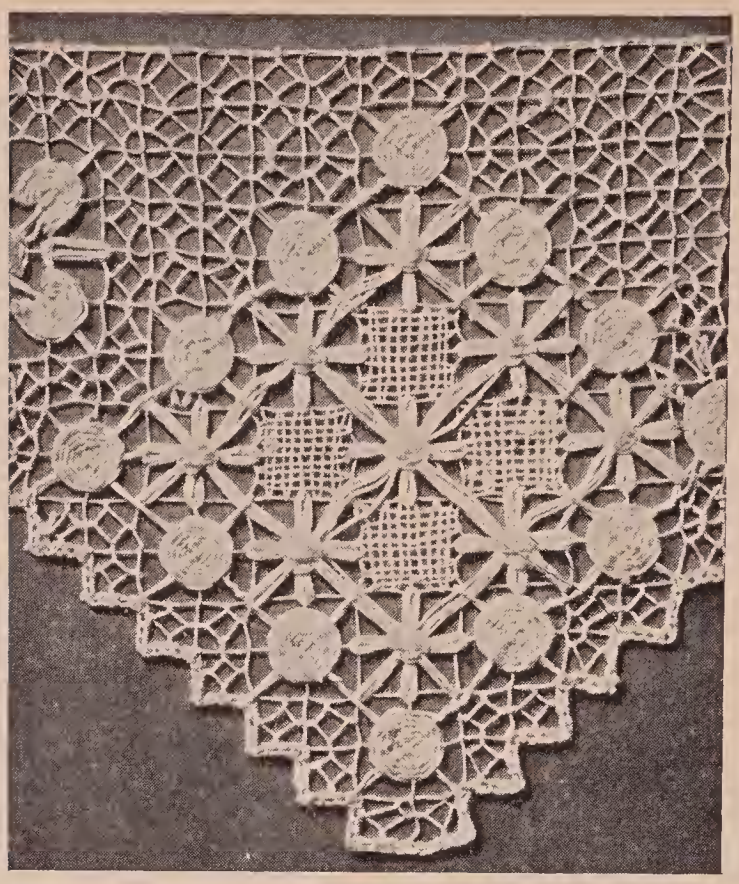
Machine-Made All-Over Net — Machine-Made All-Over Lace

FIG. 2

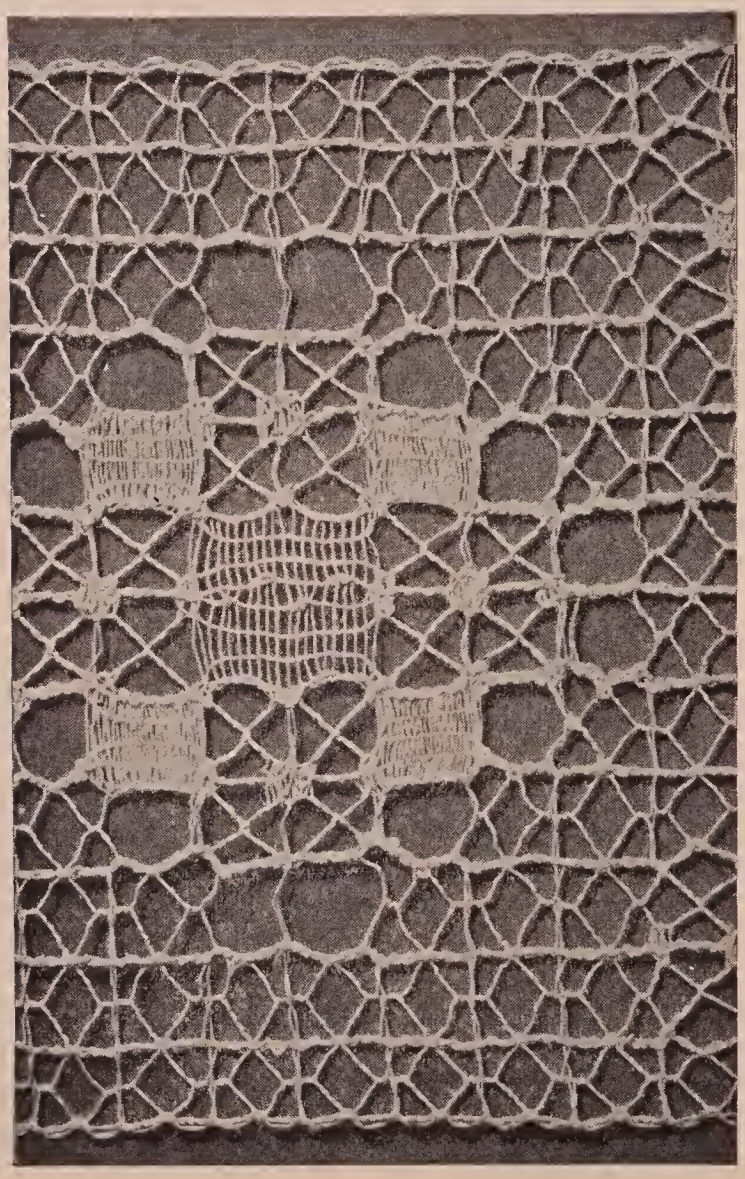
a cord effect. This lace, which was the first to use a net ground, has a closer, firmer pattern than any other lace and a very clear, fine ground. When hand-made, it is very expensive, but the machine-made variety, an example of which is shown in Fig. 1, is inexpensive and is used extensively on ready-to-wear garments.

25. Algerian lace is a narrow, flat, ornamental lace of gold and silver threads. It is used in outlining designs on garments and in draperies and fancy work.

26. All-over lace, Fig. 2, is any lace that has both edges finished the same and a pattern that repeats the entire width and

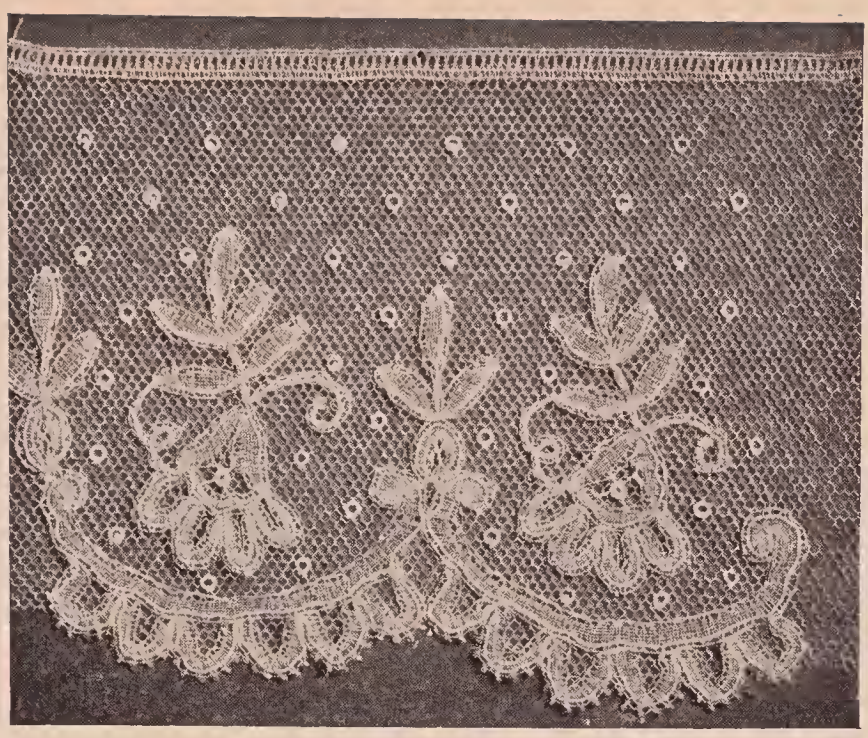


Hand-Made Antique

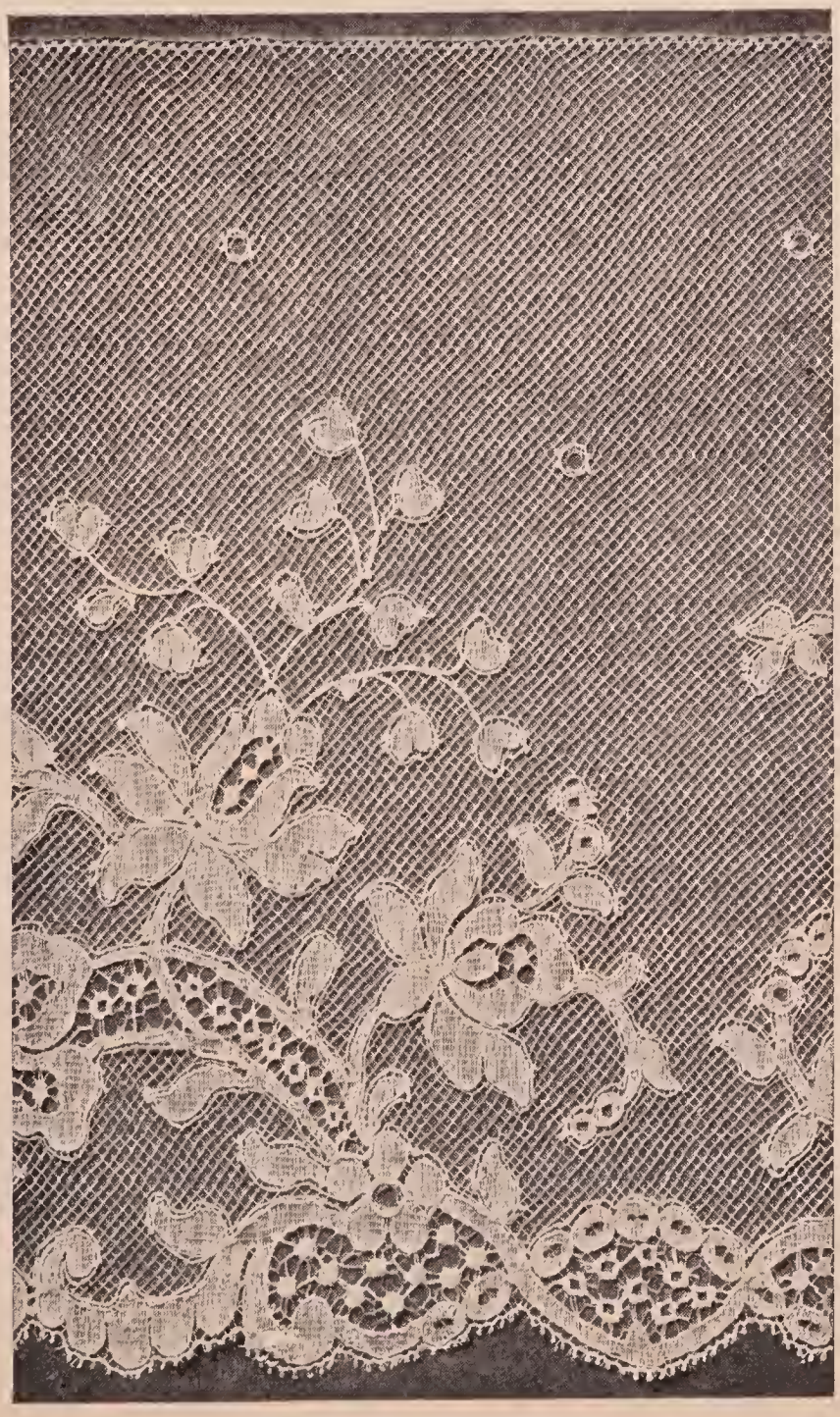


Machine-Made Antique

Fig. 3



Hand-Made Appliqué

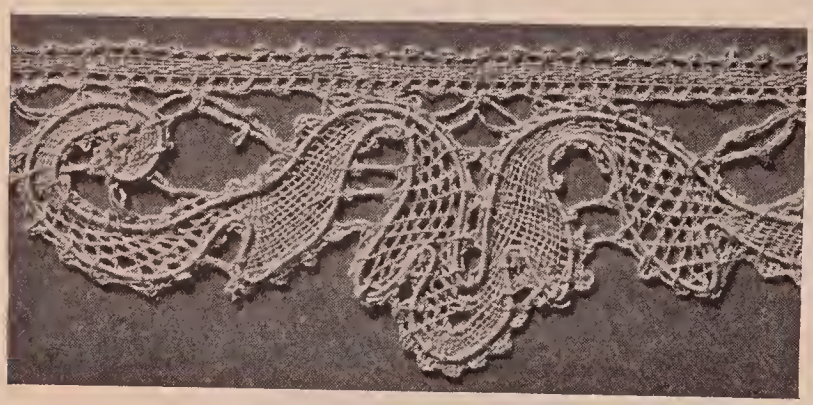


Machine-Made Appliqué

length. It comes in beautiful designs in silk, and is made also in very cheap grades. Sometimes it contains merely a dot, and again, an elaborate pattern. It is used for dresses, blouses, flounces, yokes, and sleeves, as well as for millinery.

27. Aloe lace is a coarse kind of lace made from the fibers of the aloe by the peasants of Albissola, Italy. This lace is not much in demand as it becomes mucilaginous, or gummy, in washing. Although it is usually executed in tatting, the threads are sometimes twisted and plaited. Such work is also done by the natives in Paraguay, South America. Tatting is done in aloe thread at Manila, Philippine Islands.

Hand-Made Arabian

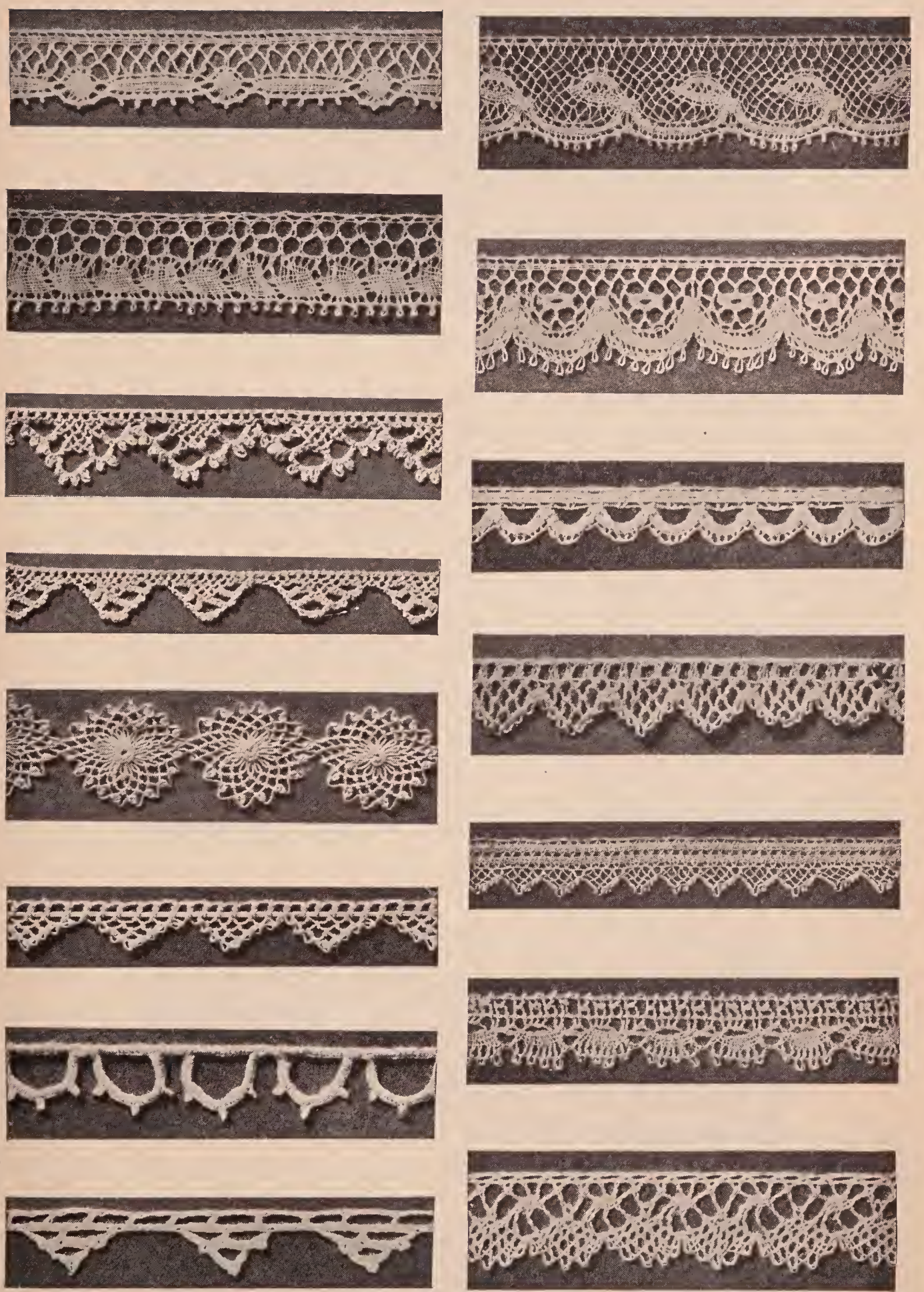


Machine-Made Arabian

FIG. 5

28. Antique lace, Fig. 3, is a hand-made bobbin lace of heavy linen thread in large, open, square, knotted mesh. It has the appearance of a coarse form of darned work done on an open-mesh weave, and is often referred to as *darned lace*. Antique lace usually has rare patterns, all kinds of designs being worked in the net by darning, and, as it is hand-made, it is expensive. Imitation antique lace is sometimes used for draperies and similar purposes.

29. Antwerp lace, a bobbin lace resembling Mechlin, was first made at Antwerp in the 17th century; it is sometimes known as Flanders lace, also. It was made in order to supply the increased demand for Mechlin lace. In one variety, the design is worked on a ground and in the other the sections of the design are merely attached by means of brides or bars. The chief characteristic of this lace is a pot or a vase of flowers, which varies in its size and its details.



Hand-Made Baby Laces

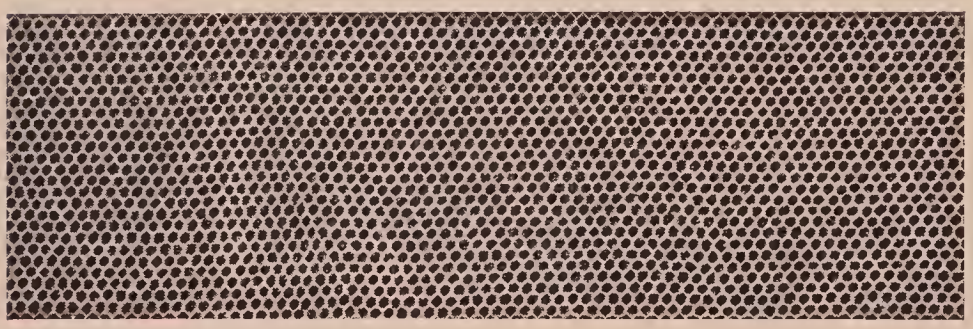
Machine-Made Baby Laces

FIG. 6

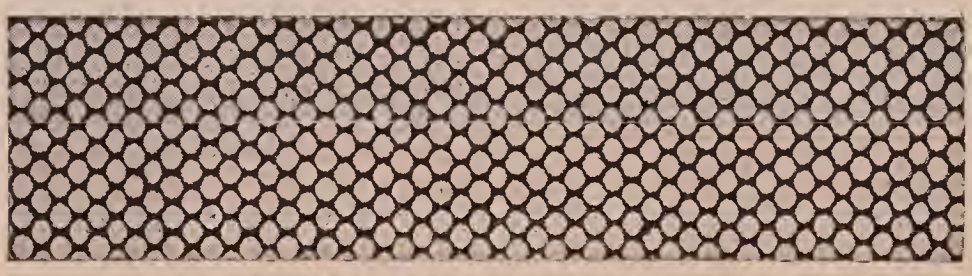
Hand-Made Battenberg

Machine-Made Battenberg

FIG. 7



Machine-Made Bobbinet

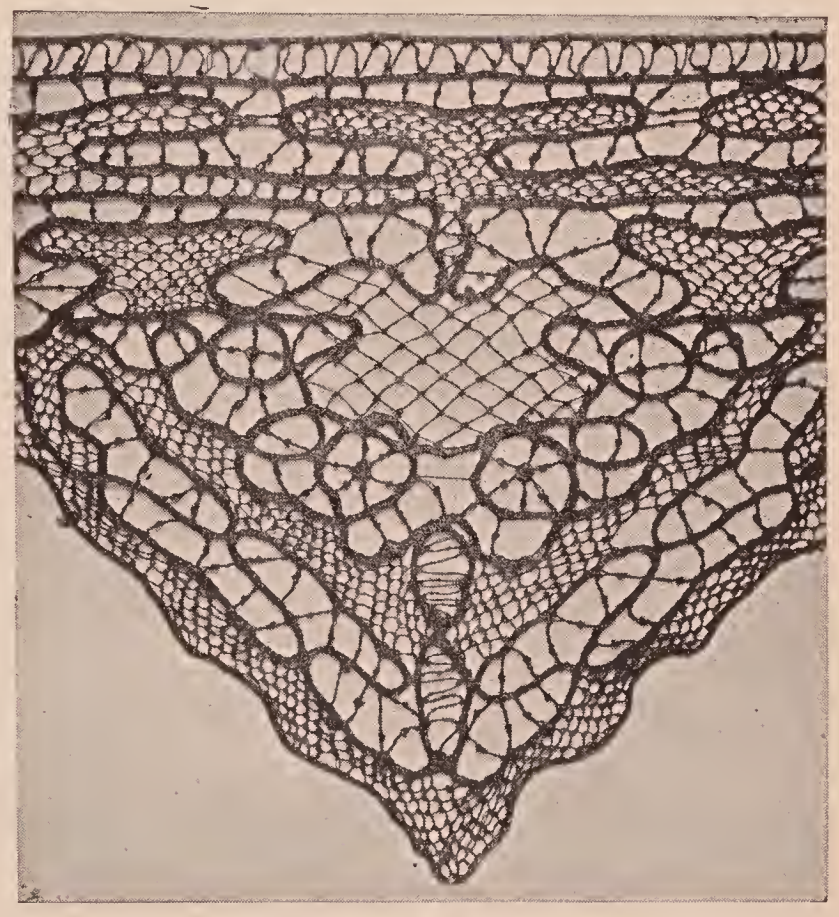


Machine-Made Tosca Net

FIG. 8

30. Appliqué lace, Fig. 4, is a lace made by sewing hand-made flowers or sprigs, which may be either needle-point or bobbin-made, on a machine net. Sometimes, the designs are made of net or thin muslin and are outlined with a chain-stitch after being applied. Appliqué lace made in Belgium is characterized by very fine net with small dots sprinkled over it. This lace is imitated very beautifully by the machine, as Fig. 4 indicates.

31. Arabian lace, Fig. 5, is a curtain lace. Its color is usually drab and it is corded with heavy, darker-drab cord. The price of Arabian lace is regulated by the nature of its design. Imitations, as a rule, are cheap and shabby in appearance, due possibly to the cheapness of the drab dye used in dyeing them.



Hand-Made Bohemian
FIG. 9

32. Argentan lace is a needle-point lace first made at Argentan, France. It resembles Alençon, as it is probable that the same workers were employed in the manufacture of both, but it has a larger and more striking pattern and there is a noticeable distinction in the net ground. This is hexagonal in shape and is larger and stiffer than any other because the sides of the mesh are covered with fine buttonhole-stitches, ten on a side, which are often so small as to be indistinguishable.

33. Baby lace, several examples of which are illustrated in Fig. 6, is a name for nearly any simple, narrow, dainty lace, whether of cotton or linen. Numerous varieties, such as Val, filet, torchon, Irish crochet, and Armenian, are made in the narrow widths suitable for baby lace. Such lace is chiefly used in making layettes, and on dainty dresses and undergarments for little folks.

34. Battenberg lace, Fig. 7, is a form of Renaissance lace but of a coarser quality, and consists of a braid, or tape, usually of fine linen thread, woven together with linen thread into all kinds of designs. It is made by machinery and by hand. Machine-made Battenberg is very cheap, but the hand-made is expensive, the price being governed by the delicacy of the pattern. The hand-made pieces are used as collars and cuffs on women and children's coats, and the coarser designs, for draperies and fancy work.

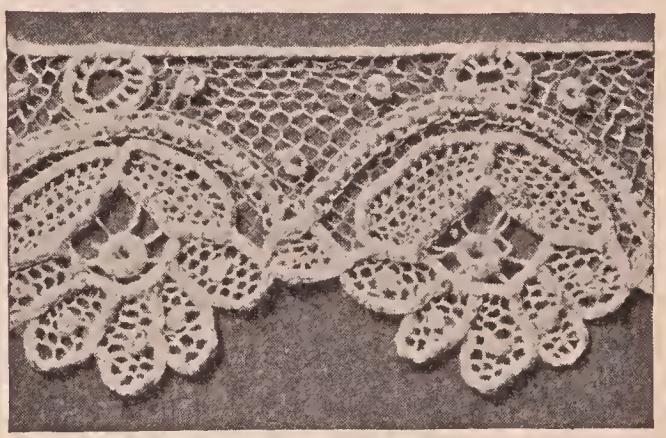
Machine-Made Bohemian
FIG. 9

35. Blonde lace was originally a heavy, closely woven bobbin lace produced in Spain and made of unbleached silk, from which it took its name. Later, the term was applied to silk laces in white, black, and colors made at Chantilly, France. It has a ground of fine, twisted silk and a toile, or pattern, worked entirely with a broad, flat strand that produces a soft, silky effect.

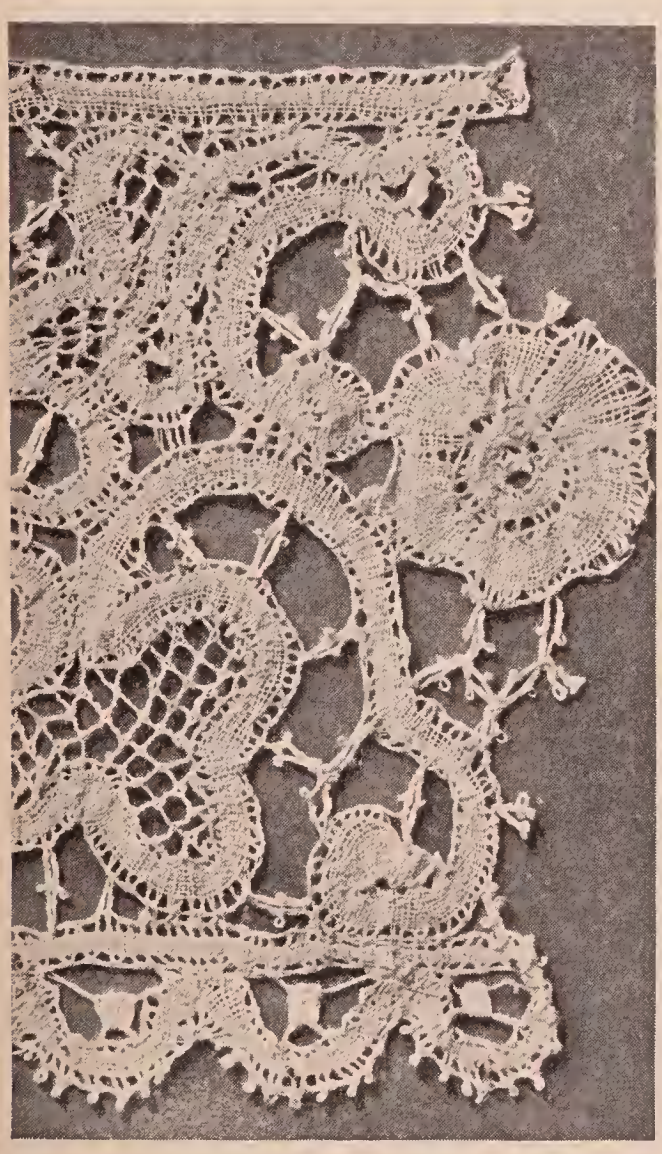
36. Bobbinet, Fig. 8, is the net made by the bobbin as distinguished from that made by the needle. Modern bobbinet is a machine imitation of the original hand-made bobbinet. It has hexagonal, or six-sided, holes but no designs and is used for dresses, dress foundations, overdrapes, and draperies. The price of

bobbinet depends on the firmness of the mesh, the coarser weaves being less expensive than the finer ones. A kind of bobbinet, called Tosca net and shown in Fig. 8, is more open than ordinary bobbinet, but it is very firmly woven, and consequently very durable.

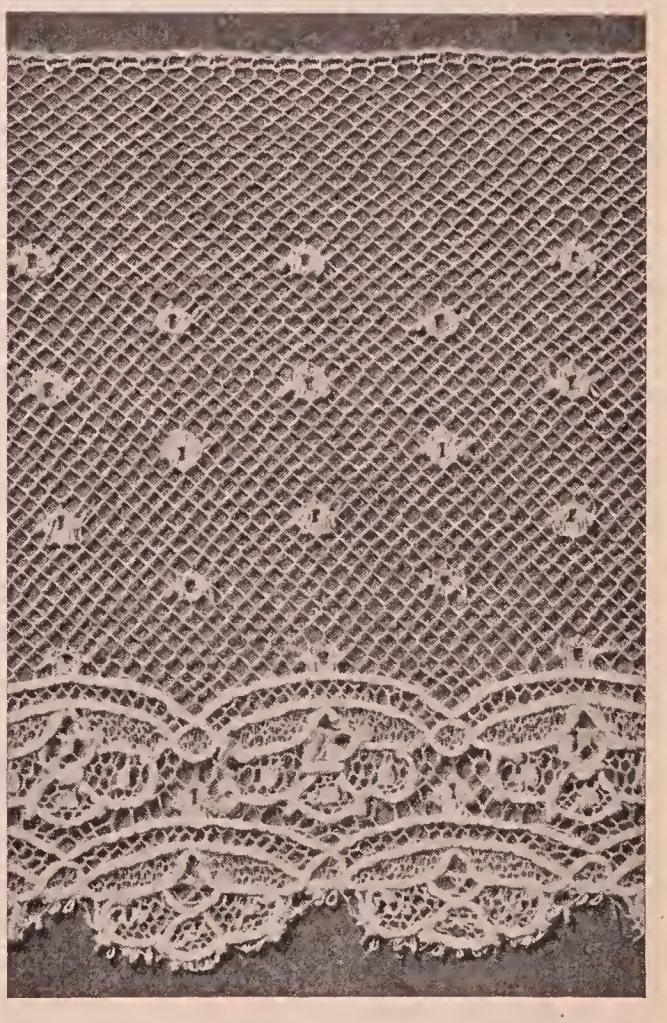
37. Bohemian lace, Fig. 9, is a bobbin lace that is made in Bohemia and may be recognized by the tape-like effect in the pattern. As a rule, this lace is too coarse in weave and design to be suitable as dress trimming. It is



Hand-Made Brussels



Hand-Made Bruges
FIG. 10

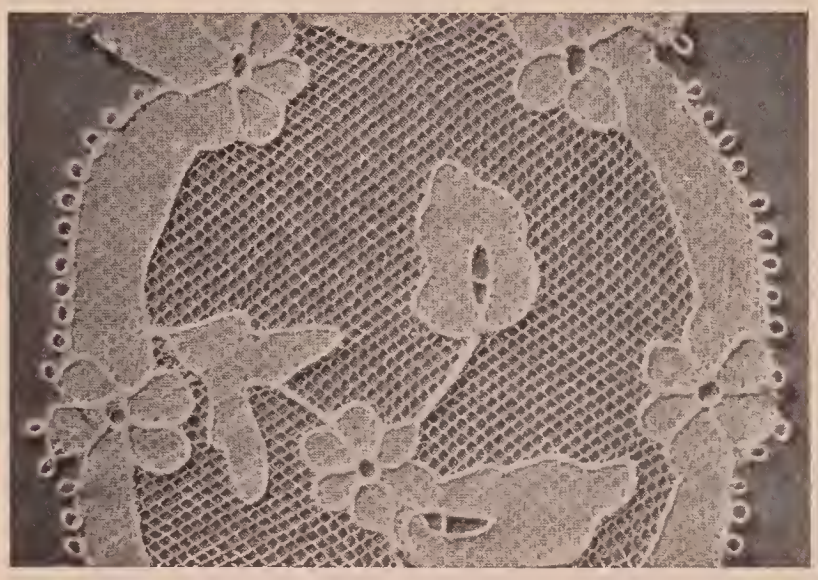


Machine-Made Brussels
FIG. 11

both hand- and machine-made, the machine-made variety being very effective for it often imitates the designs of the old Bohemian laces.

38. Bruges lace, Fig. 10, consists of fine lace tape woven together with fine thread. The real lace is made in much the

same way as duchesse lace, but it is, as a rule, somewhat coarser. The fine weaves of this lace are suitable as dress trimmings, and the coarser, cheaper grades are used for table-cover finishes and draperies.



Hand-Made Appliqué Carrickmacross

Machine-Made Appliqué Carrickmacross

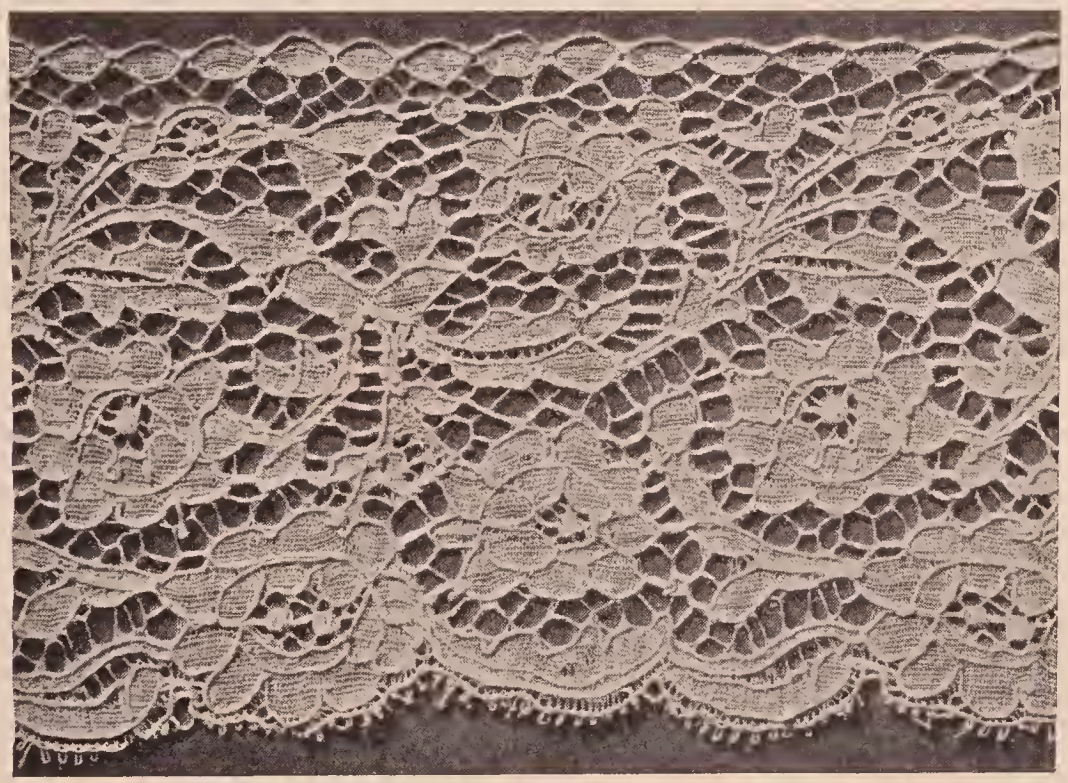
FIG. 12

39. Brussels point lace, Fig. 11, is a lace of exquisite fineness in which the designs are made separately and then assembled and applied to a net ground. Formerly, the ground was worked with bobbins around the flowers, but later the flowers were sewed to a machine net. At one time, Brussels lace was smuggled into England and called Point d'Angleterre to avoid the duty. The earliest Brussels point resembled Alençon lace in that the designs were outlined with a cord, but this outlining thread was not covered with buttonhole-stitches nor was the lace so close and firm.

In the lace trade, Brussels point is a name given to very fine laces, regardless of the pattern. It is called Rose point when its pattern contains rose motifs, and Point Gaze when its designs are of a very fine, open, delicate kind.

40. Carrickmacross lace is of two kinds—appliqué and guipure. *Appliqué Carrickmacross*, Fig. 12, is made by placing sheer

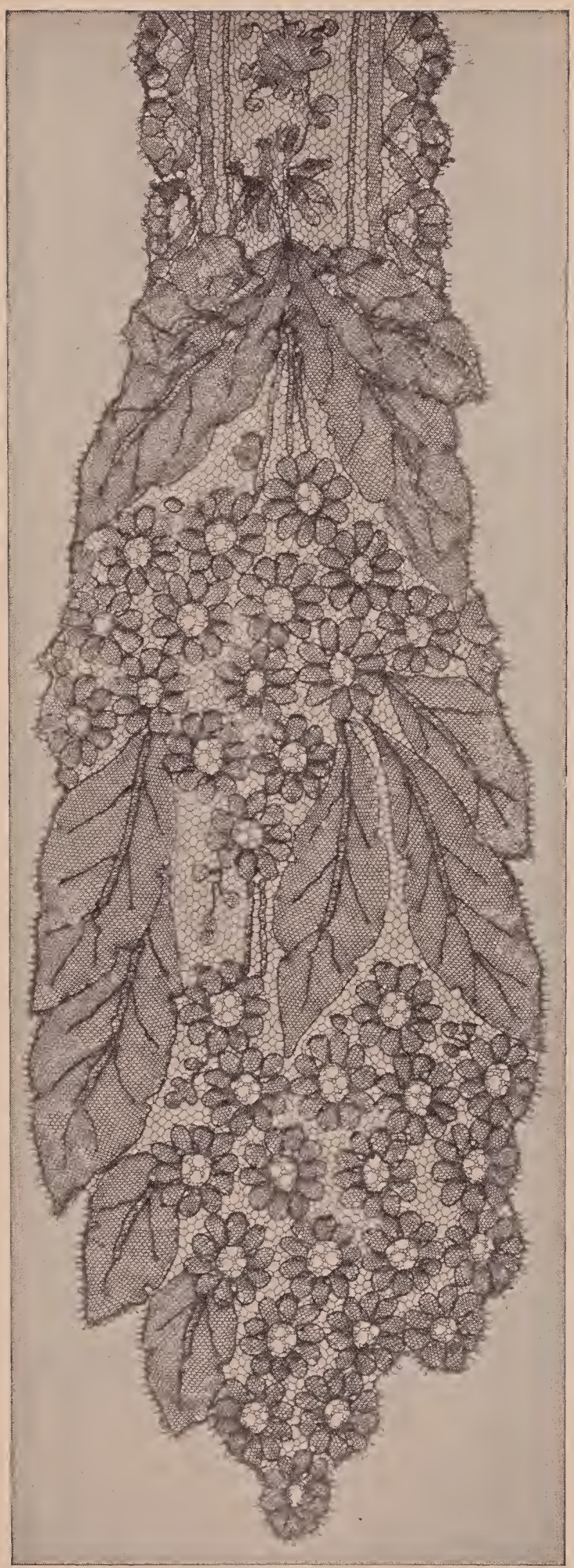
material over plain net and applying designs to the net with the buttonhole-stitch or the chain-stitch, and then cutting away the surplus material so as to leave the outline of the design clear. *Guipure Carrickmacross*, Fig. 13, which is a heavy lace, closely resembles cut work. It is made by working the outline of the design over a foundation and then connecting the motifs or designs with crocheted brides, or loops, or loops ornamented with petals or picots, as in Irish crochet lace. The centers of the flowers, in hand-made Carrickmacross, are cut away and the openings filled with lace stitches and the detached parts of the pattern connected with bars. Hand-made Carrickmacross, which is rather expensive,



Machine-Made Guipure Carrickmacross
FIG. 13

is used for whole dresses and as trimming for dresses, and the machine-made is used for inexpensive curtains.

41. Chantilly lace, Fig. 14, was named from the town of Chantilly, France, but it is now made in the towns of Bayeaux, Grammont, and Calvados. It is bobbin lace characterized by fineness of ground, light, open-work flowers, and thick, silky threads outlining the patterns. Black Chantilly, which is said to have no rival in the lace realm and has a fine ground and elegant floral patterns, appeared in the 17th century made out of a grenadine, or non-lustrous silk.



Hand-Made Chantilly

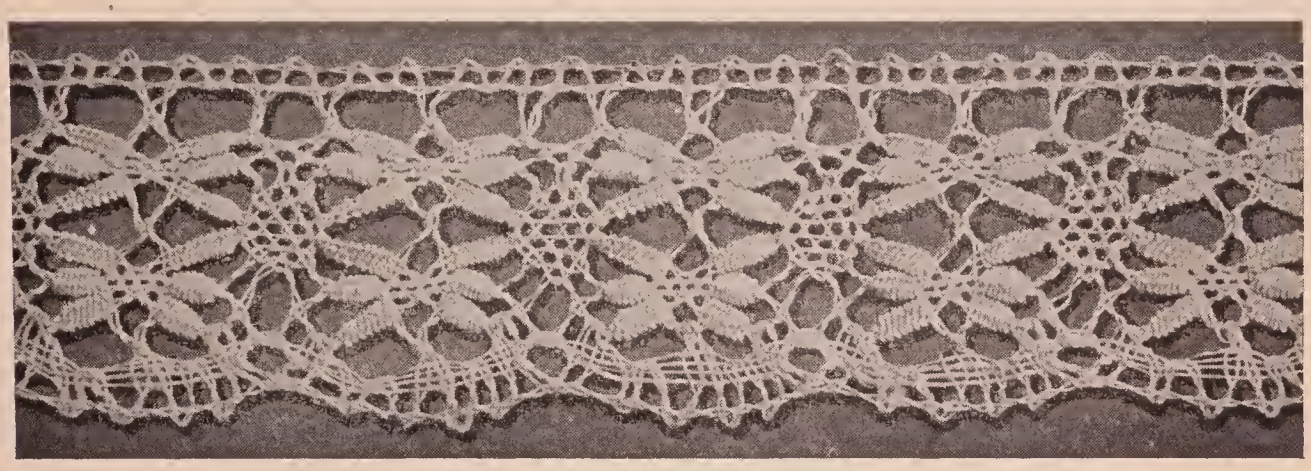
Machine-Made Chantilly

FIG. 14

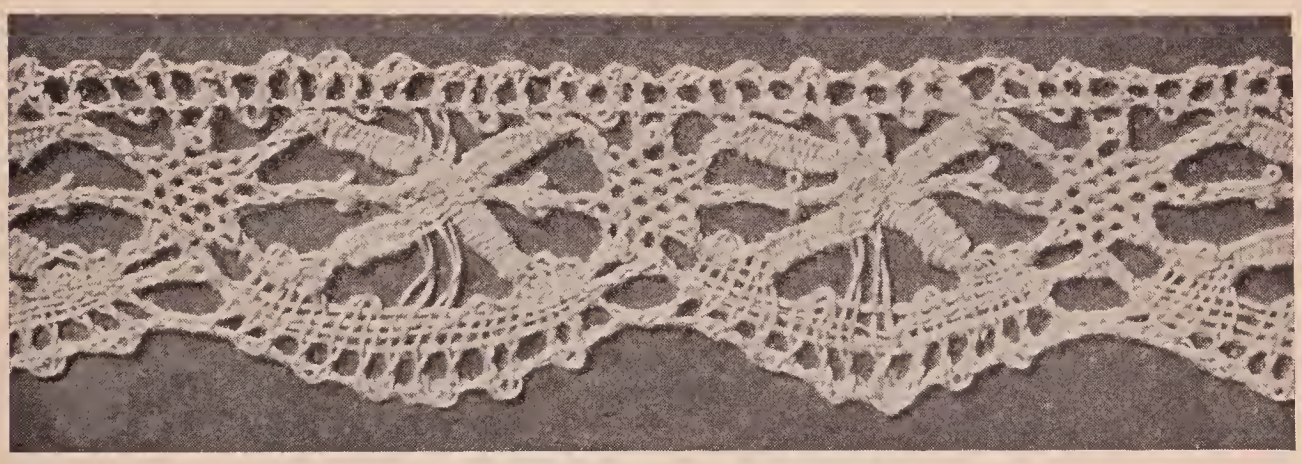
The imitations of Chantilly follow closely the designs of the original laces, and while they are not equal in quality to the real lace and are generally made of cotton thread, they are extremely effective.

Chantilly lace is used for dress trimmings, flounces, overdrapes, and dresses. It is expensive at the outset, but it is very durable and may be used again and again.

42. Cluny lace, Fig. 15, is a coarse-thread bobbin lace made of a heavy, strong, tightly twisted thread in linen and cotton. It



Hand-Made Cluny



Machine-Made Cluny

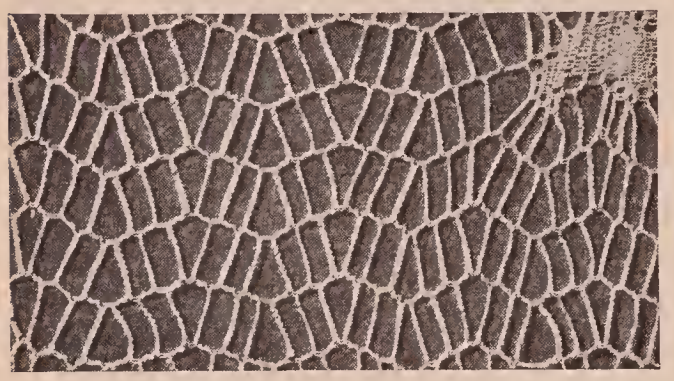
FIG. 15

is named from the Museum of Antiquities in the Hotel Cluny, Paris, because it is supposed to have an antique look. It is similar to torchon lace, but is distinguished by its geometrical designs, which often take the form of wheels and paddles.

The machine-made Cluny has reached such a degree of excellence that it is sometimes difficult even for experts to detect the difference between the real and the imitation. However, there are three distinguishing points: (1) Machine-made Cluny is made of two

sizes of thread and hand-made, of one; (2) its threads have a crinkly, irregular look instead of a straight, taut one, as in hand-made; (3) the thread used is generally cotton, while linen thread is used in the hand-made.

Fine weaves of Cluny lace are used in lingerie blouses and dresses; the coarser weaves, for pillows, centerpieces, and so on. The durability of hand-made Cluny makes it inexpensive, even though the original cost may seem exorbitant.



Craquelé Net
Fig. 16

43. Craquelé net, Fig. 16, consists of a firm thread woven in zigzag effect and producing a mesh that is sometimes used in shadow lace of good quality and resembles the crackle in old pottery. It has beautiful designs, which make it attractive for overdrapes and all-lace dresses. It is more expensive than plain net.

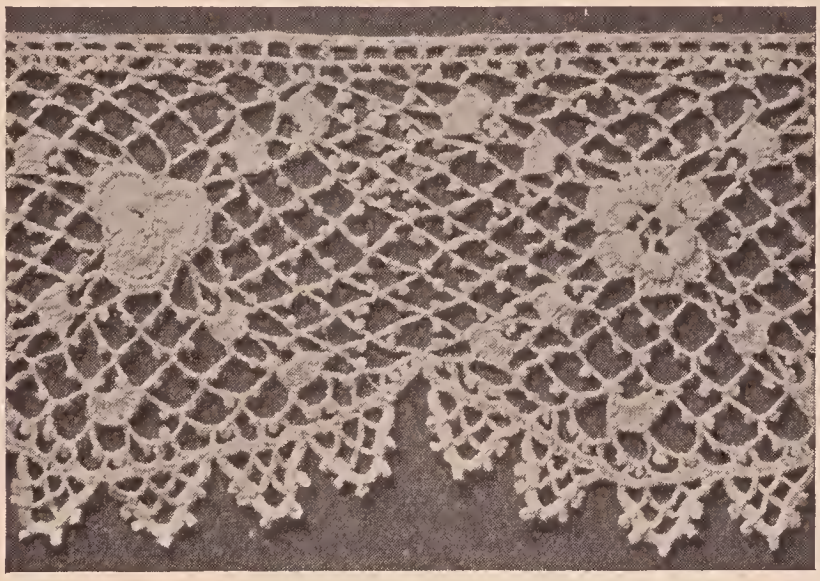
44. Crochet lace is lace which, in the hand-made variety, differs from other hand-made laces in that it is made with a crochet hook and but a single thread. It is similar to needle-point lace, but does not equal it in fineness. In their designs, crochet laces usually imitate needle-point laces, such as Venetian and Honiton.

Irish crochet, Fig. 17, is probably the most popular variety of crochet lace. The distinguishing mark of this lace, which is difficult to imitate, is the crochet-stitch or the buttonhole-stitch, which is followed by every thread of the work. As shown in the illustration, this lace comes in a heavy variety known as heavy Irish crochet, the designs of which have an outlining cordonnet, and a fine, flat variety, known as Baby Irish and in which the cordonnet is omitted. This kind of Irish lace is closely imitated, as shown in Fig. 17, in both pattern and width. Real Irish lace is distinguished by its thread, linen thread generally being used, and it has a stiff, starchy feel rather than a soft, puffy one as in the imitation.

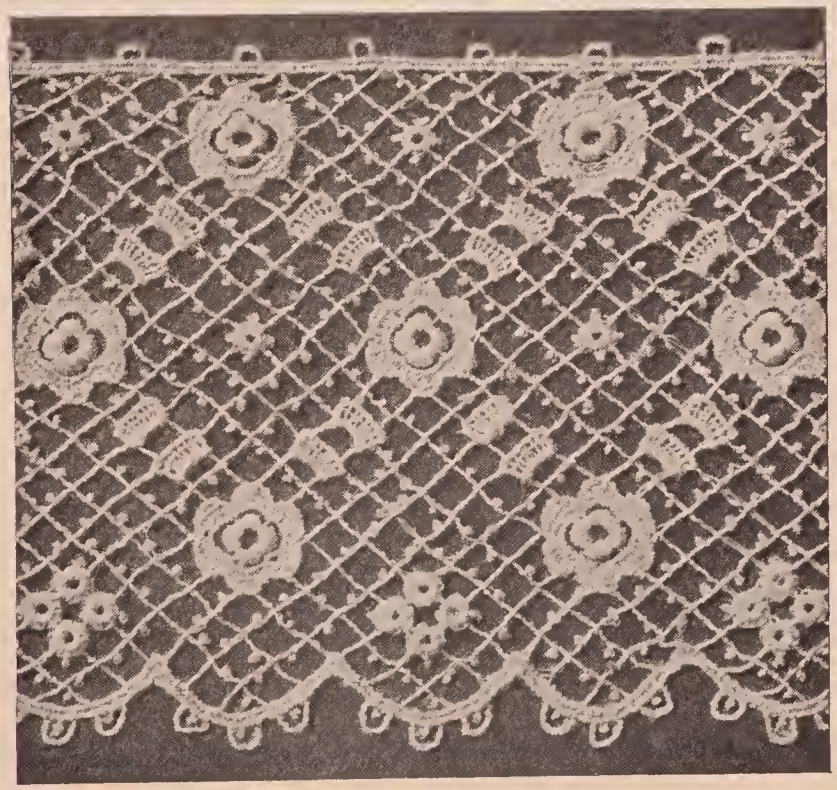
The best Irish lace is made in Ireland, but much of this lace, and good qualities, too, comes from Armenia, Austria, Germany, Italy, China, and France.

Irish lace of both kinds is used chiefly as trimming for women and children's dresses.

Hand-Made Irish Crochet



Hand-Made Baby Irish



Machine-Made Baby Irish

FIG. 17

45. Curtain lace, which is all machine-made, comes in many different varieties. Probably the best known kind is found in Brussels lace, or Nottingham, curtains. On a foundation of machine-made net, a design is worked either by hand or by machine. Saxony Brussels curtains are characterized by a double net in the design, while Swiss Brussels curtains have a single net throughout and a machine-made chain-stitch that forms the designs. The lace-curtain industry in America has been making rapid strides for a number of years, so that many beautiful curtains are now made here.

46. Cut work is made by cutting spaces out of closely woven linen, buttonholing around the sides to prevent them from fraying, and then partly filling in the space with ornamental stitches. It is tedious to make, a fact that accounts for the expensiveness of hand-made pieces. Cut work is used on linen collars and cuffs, as well as in fancy work.

Cut work was known in the earliest stages of lace making. In the old specimens of this work, elaborate embroidery was worked on plain linen. Gradually, more of the linen was cut away and more elaborate designs were filled in until only threads were left. These were buttonholed over and what is known as reticella lace was produced.

47. Drawn work is a kind of ornamental work which dates from early times and is produced by drawing certain threads out of a piece of material and then securing the remaining threads by a series of continuous hemstitching stitches. Many threads may be drawn and designs formed in the remaining threads by weaving, darning, or tying with other threads. Drawn work is an attractive finish for lingerie garments, but is chiefly used in fancy work. Hand drawn work is not overly expensive, because it can be made at home with little effort and outlay. Machine drawn work is rarely desirable. *Dresden point lace*, which was made during the 17th and 18th centuries, was a kind of hand drawn work.

48. Duchesse lace, Fig, 18, is a bobbin lace in which the ground is one of brides and bars rather than net. Some sections of the design, which consist of flowers, leaves, and sprays, are closely woven, imparting to this lace a tape-like effect similar to that of Battenberg lace. Duchesse lace is rather expensive, but its wear-

ing qualities are good. It has some exquisite patterns and is therefore suitable as trimming for elaborate gowns, especially bridal robes. The motifs of duchesse lace are imitated in princess lace, but not much similarity is seen because these motifs are applied to a net ground in princess lace.

Hand-Made Duchesse

49. Egyptian lace is a fine, hand-made, knotted lace that is sometimes ornamented with beads. It is expensive and therefore rarely used. When it is used, it is made to serve as trimming.

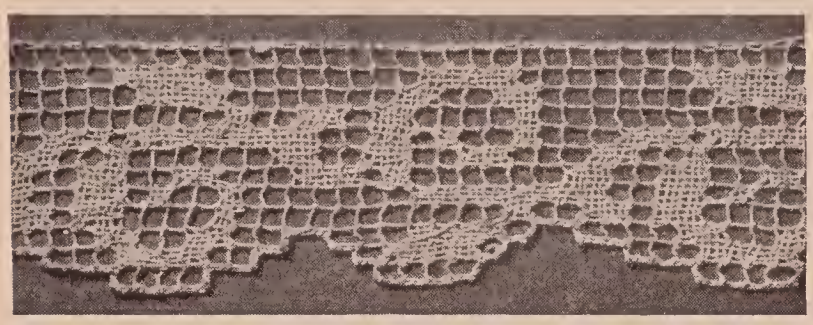
50. English point lace, often referred to as Point d'Angleterre, is an extremely beautiful lace equal in design and making to many of the point laces of France and Italy. The mesh is always made with bobbins, but the pattern is usually made in needle-point. Raised ribs, which are produced by twisting or plaiting the bobbins, are sometimes seen on the leaves or other parts of the design. The ground shows much variation, fine needle-point fillings often being used and bobbin-made brides, or connecting bars, also being employed.

Machine-Made Duchesse

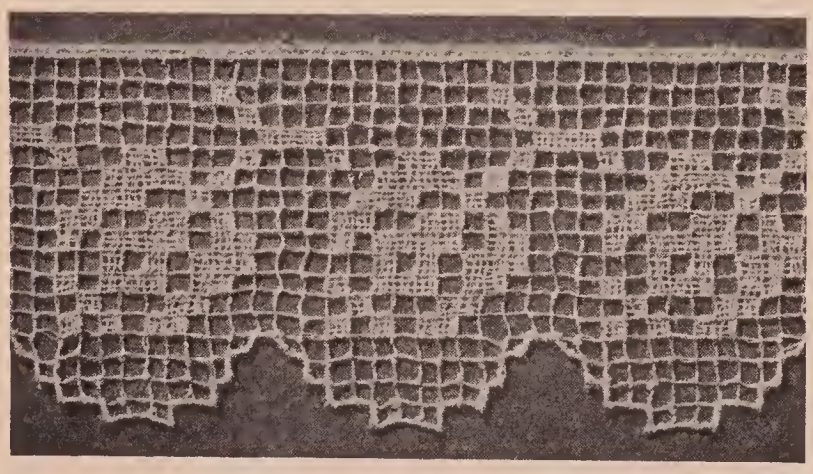
FIG. 18

A mistaken idea that Point d'Angleterre originated in Belgium existed for some time. This was due to the fact that at one time in England the importation of laces was forbidden. However, much more lace was needed to fill the demand than could be supplied in England, so the English lace merchants bought up the finest Brussels laces and smuggled them into England under the name of English point or Point d'Angleterre. The original lace, however, is purely an English lace and the chief portion of the finest varieties was made in England.

51. Fiber lace is made from the fibers of the banana and the aloe plant. It is a frail, expensive lace, and is not practical for many purposes. However, both banana-fiber and aloe-fiber lace are used as dress trimming, especially on sheer organdies and chiffons.



Hand-Made Filet

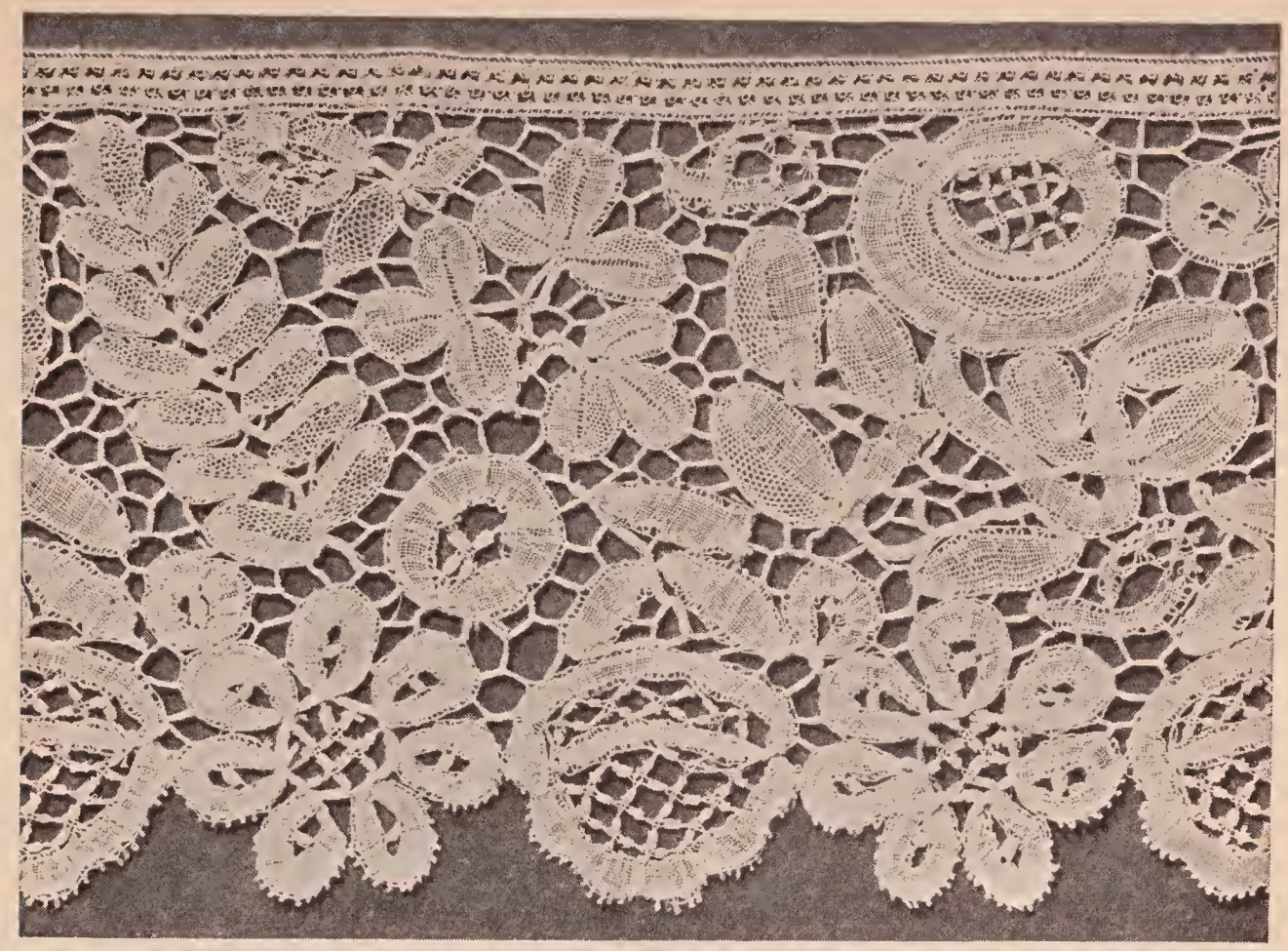


Machine-Made Filet

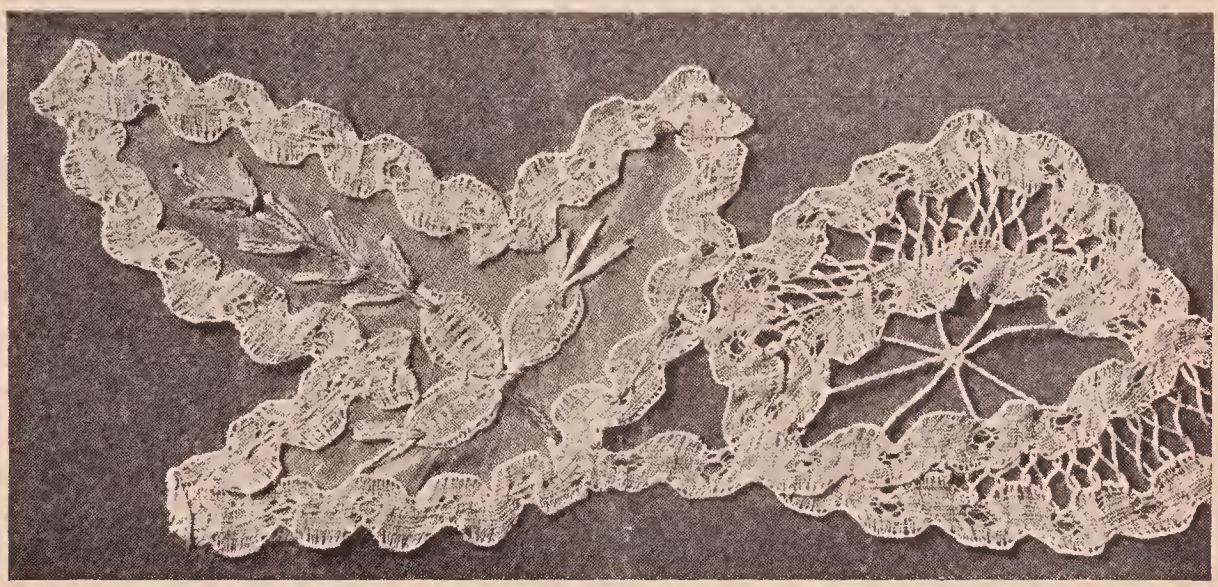
FIG. 19

52. Filet lace, Fig. 19, is a darned or embroidered net woven into squares with a continuous thread, there being a knot at each corner of the square mesh. It is perhaps one of the most attractive and practical of the lingerie laces, and is excellent for blouses and dresses. Real filet lace is expensive, but it wears indefinitely. Chinese filet lace is coarser and consequently cheaper than the other varieties. Beautiful imitations of filet lace may be purchased at very reasonable prices.

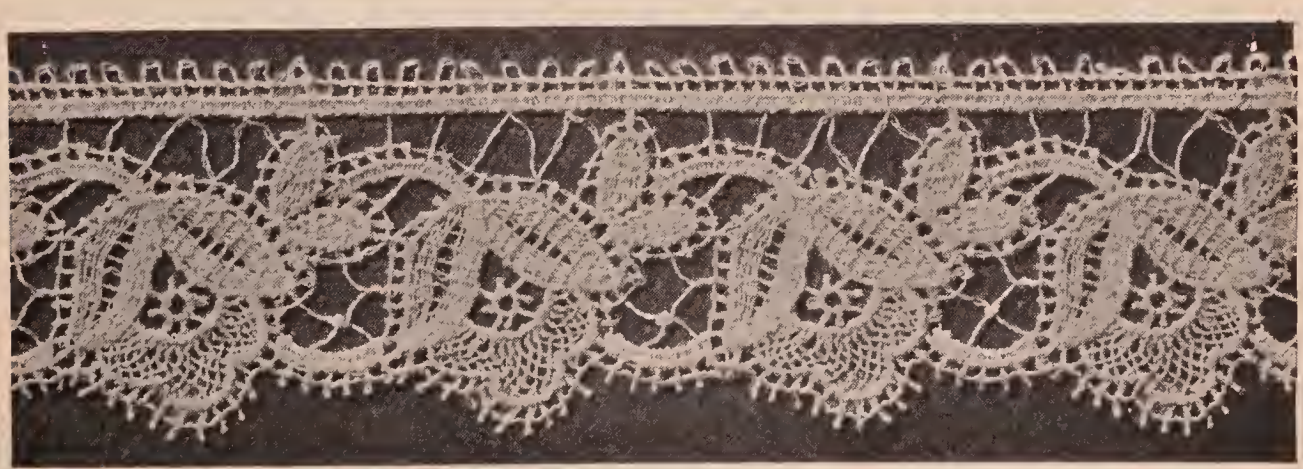
53. Guipure lace was probably a bobbin or needle-made lace of gold, silver, or silk threads, but now this term is usually applied to all large-patterned laces having coarse grounds, flowers joined by brides or coarse stitches, and no delicate groundings, and



Hand-Made Honiton Guipure



Hand-Made Honiton Appliqué



Machine-Made **Honiton**

FIG. 20

includes duchesse, Honiton, Maltese, and Venetian laces. The word guipure is derived from *guipe*, which means a thick cord around which silk is rolled. This padding, which was known as cartisane, was not durable as it would not wash and shrivelled up with heat, so the pattern was soon destroyed. In time, it was replaced by a cotton thread and gradually the lace came to be made with heavy tape rather than a rolled cord.

54. Honiton lace, Fig. 20, a pillow lace originally made at Honiton, England, consists of round, heavy motifs or sprays of

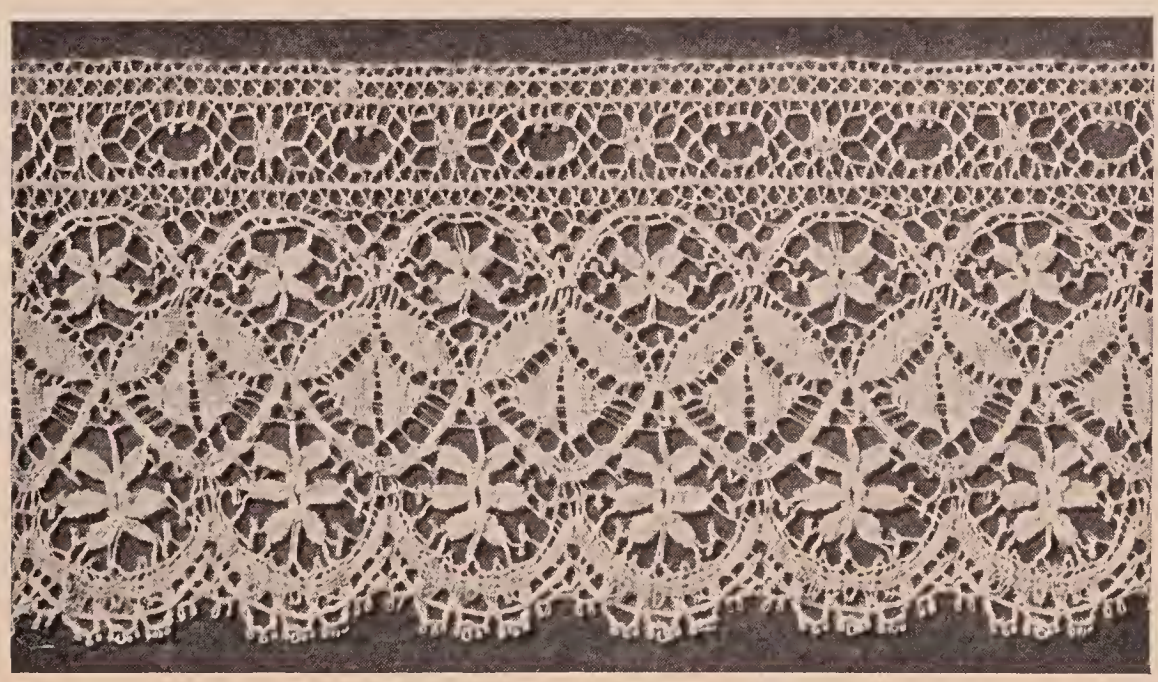
Hand-Made Limerick
FIG. 21

finely woven braid joined with a needle. Honiton lace is either appliqué or guipure. The *appliqué Honiton* is made by applying the motifs to a ground that is usually machine-made net. *Honiton guipure* is characterized by large flower patterns joined by needle-made bars. It is similar to duchesse lace, but is heavier in effect. The chief use of Honiton lace is as a dress trimming. The machine-made varieties usually show a tape-like effect.

55. Lille lace is a French lace that resembles Mechlin, except that the sides of its mesh are twisted, whereas in Mechlin they are braided. Its designs are of a simple nature, being usually outlined

Machine-Made Macramé

FIG. 22



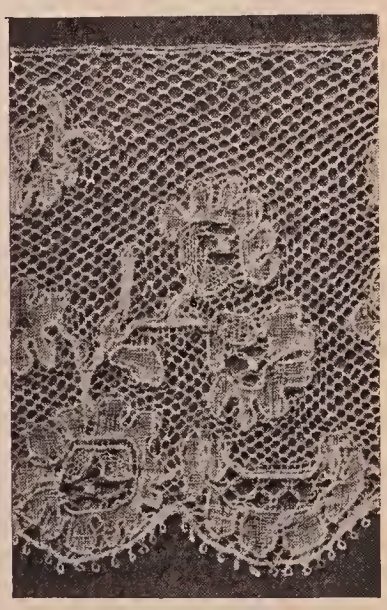
Machine-Made Maltese

FIG. 23

by a thread of flat, untwisted flax, and its ground is sometimes sprinkled with dots.

56. Limerick lace, Fig. 21, is not a real lace but consists of delicate patterns embroidered on net or muslin with either a chain-stitch or a darning-stitch. Real Limerick lace is beautiful as a dress trimming, but as a rule it is expensive; machine-made Limerick, on the other hand, is more ordinary in appearance and less expensive, but it makes an effective dress trimming.

Machine-Made Mechlin



Hand-Made Mechlin

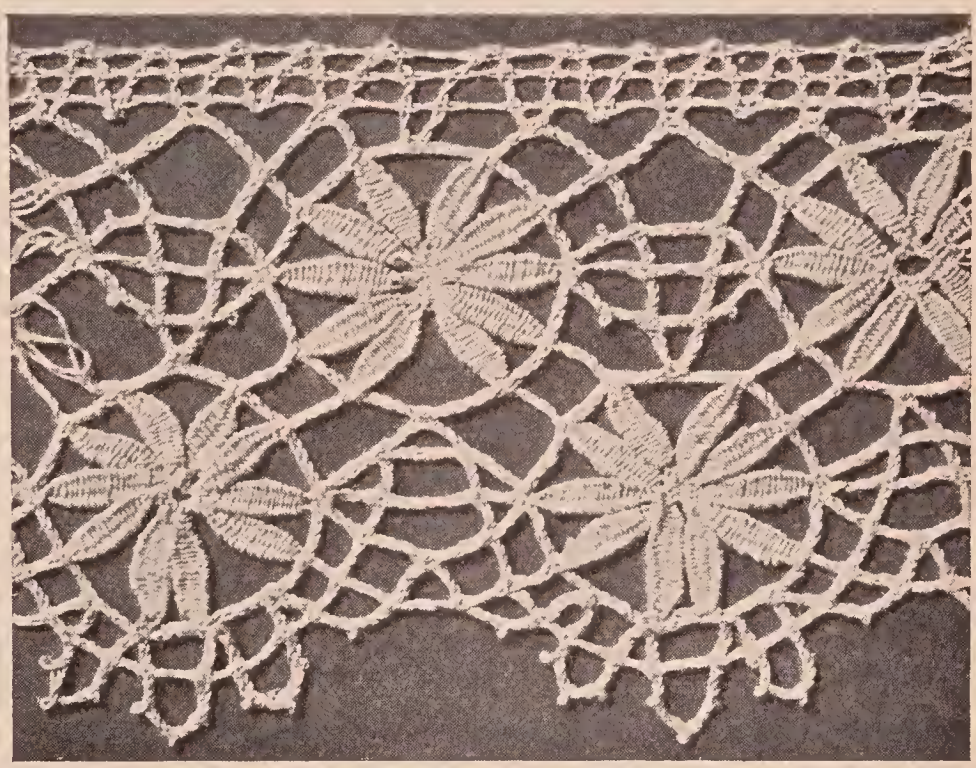
FIG. 24

57. Macramé lace is of Spanish origin. It is a surviv-

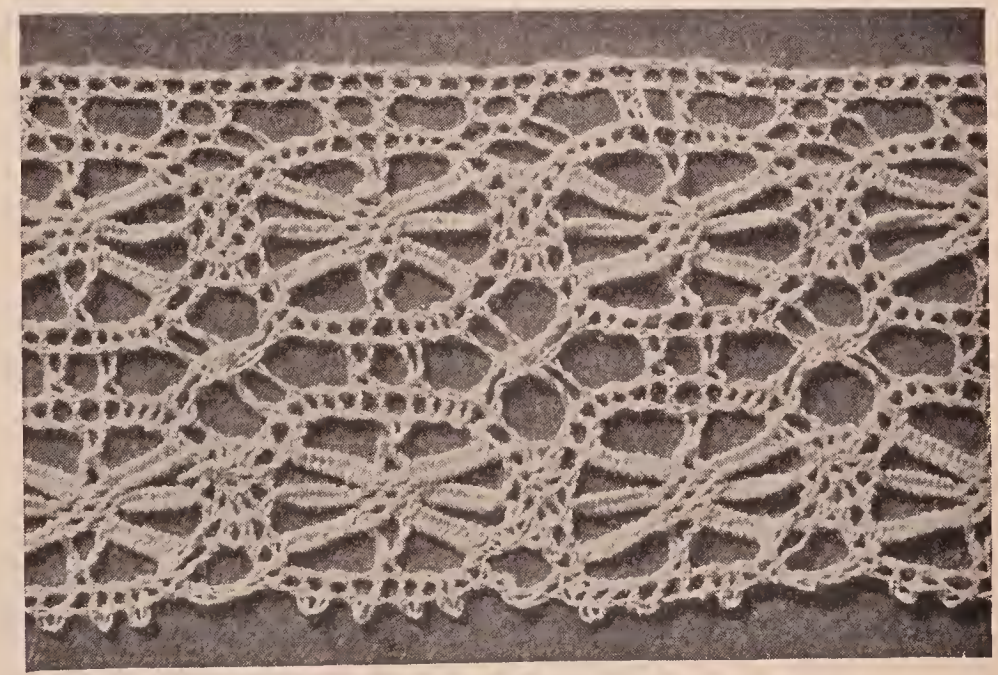
al of knotted point lace and is woven usually in geometrical designs down from the selvage, many ends being woven together and then tied to form the pattern. Macramé cord, which is made out of close-twisted cotton thread, is manufactured for this purpose. Frequently, the threads are allowed to hang loose and form a fringe. Fine silk macramé is used for scarf and shawl ends and the coarse

carpet-warp kind is used for finishing the edges of bedspreads, table scarfs, etc. Macramé wears indefinitely, and the machine-made kind, which is illustrated in Fig. 22, though rather expensive, is excellent when a heavy lace is desired.

58. Maltese lace is a bobbin lace of more open weave than either Mechlin or Valenciennes, but it is not unlike either of these laces. It has no regular ground and, as a rule, the patterns include a conventionalized Maltese cross and dots called "mosca." It is made both in thread and in black and white silk. The machine made variety, Fig. 23, is moderately priced, wears well, and is used for dresses and lingerie garments.



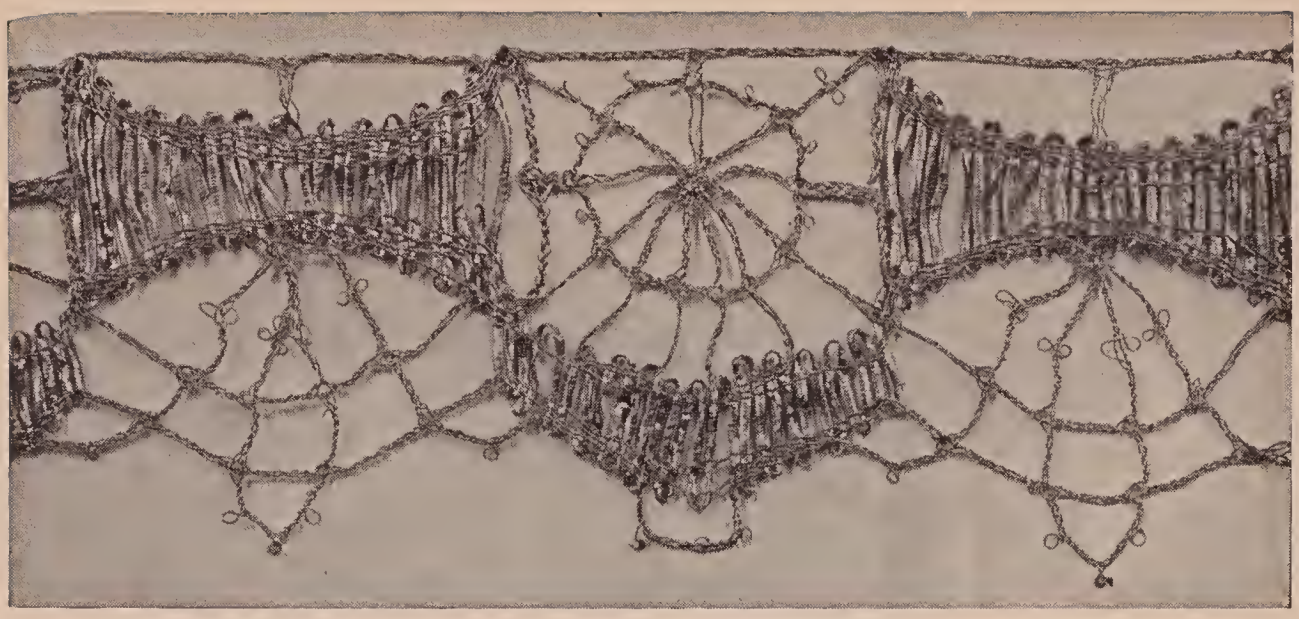
Hand-Made Medici



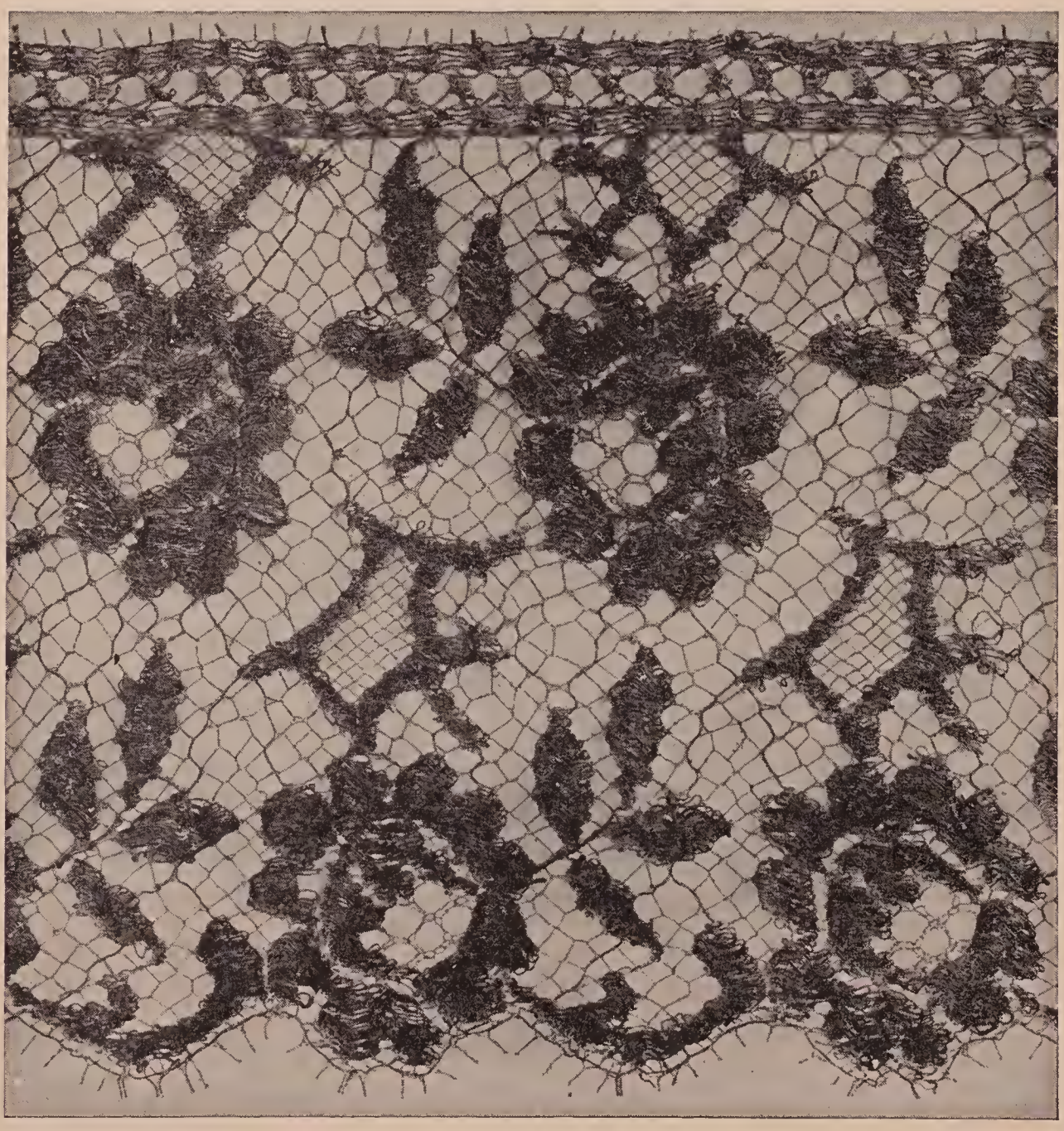
Machine-Made Medici

FIG. 25

59. Mechlin lace, Fig. 24, is a very fibery, beautiful, bobbin lace. The patterns, which are chiefly flowers and buds and resemble those of Brussels lace, are outlined with a thread of flat, silky flax. The net ground has hexagonal meshes in which four of the sides consist of two threads twisted and the other two, four threads



Hand-Made Metal Lace



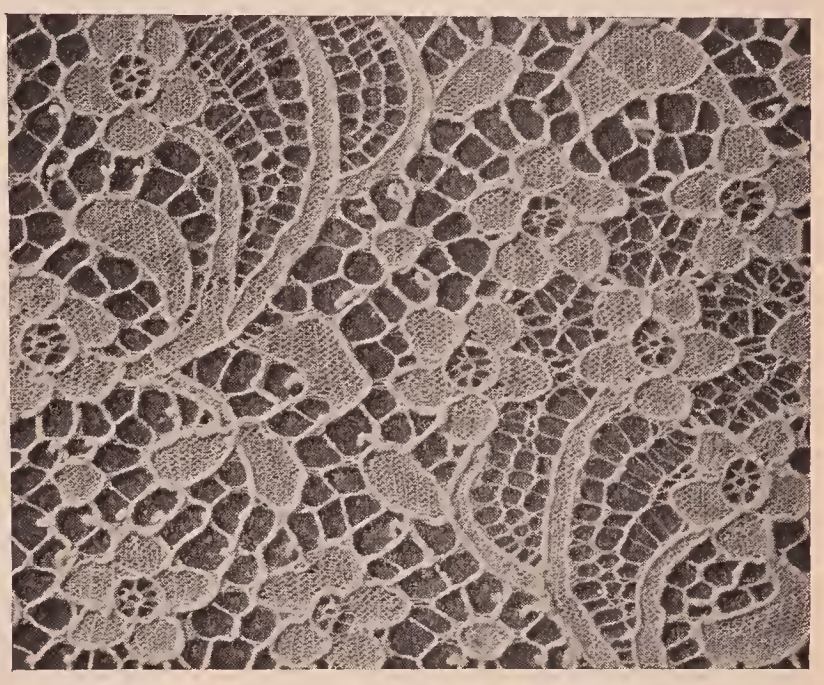
Machine-Made Metal Lace

FIG. 26

plaited. The making of this lace requires great skill, so it is rather costly, but it is closely imitated on the machine and the machine-made variety may be purchased at reasonable prices. Mechlin lace makes a very beautiful trimming for non-washable dresses, the nature of the mesh and the fineness of the thread preventing it from washing satisfactorily.

60. Medici lace, Fig. 25, resembles Cluny, but it is usually made of finer thread and has one of its edges finished with scallops. It is characterized by closely woven work alternating with an equal amount of open work. It is rather difficult to imitate this lace on the machine, and still there are some machine-made varieties that are very well done.

Medici lace is used for the same purposes as Cluny lace.



Nottingham Lace
FIG. 27

61. Metal lace, Fig. 26, which is made both by hand and by machine, is developed out of gold or silver threads. The hand-made variety, which is very rare and consequently expensive, is a guipure lace, whereas machine-made metal lace consists of a net foundation in which are woven all kinds of designs with metal threads. It is used as trimming for evening dresses and robes and in millinery work, many beautiful effects being created with it.

62. Nottingham lace, one kind of which is shown in Fig. 27, is a term that includes all of the machine-made laces made at Nottingham, England, the center of the machine-made lace district. Curtain laces are produced in large quantity, but there are also clever imitations of many hand-made laces, such as Valenciennes Mechlin, and Chantilly.

Laces made at Nottingham are both white and cream and are used largely for curtains, but the finer weaves are employed for dress trimmings.

Oriental Lace
FIG. 28

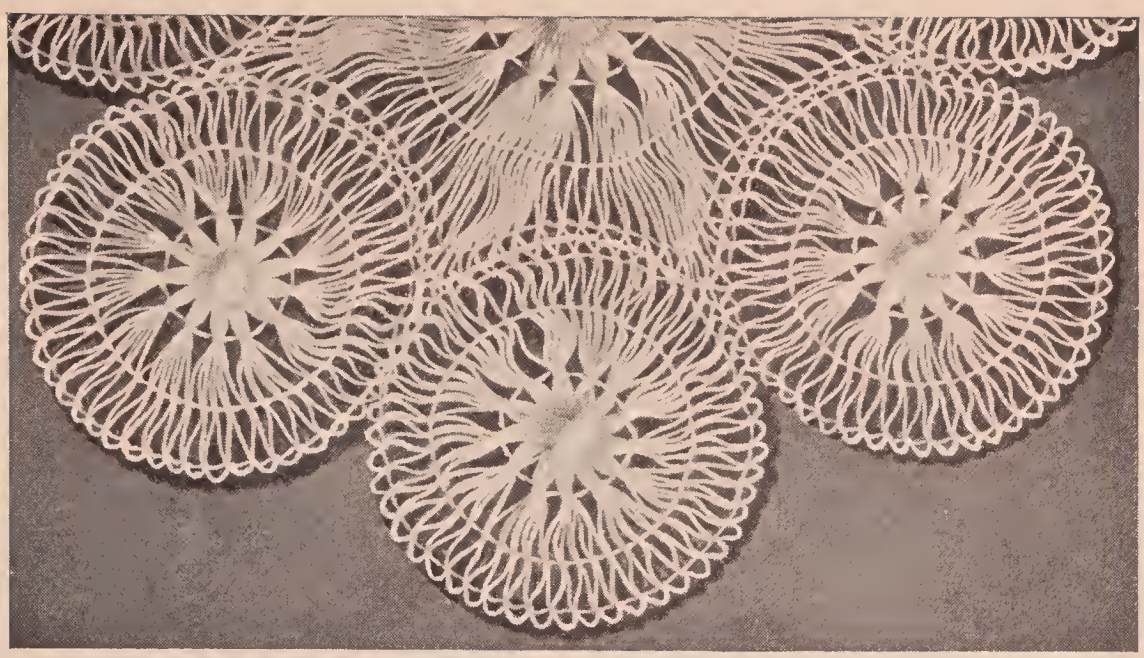
63. Oriental lace, Fig. 28, is in reality an embroidered net from which the ground is not cut away. In the making of this lace, two threads are used, one, which is heavy, being employed to make the design on top, and the other, which is lighter, holding the design underneath.

Oriental laces come in many designs and widths and are highly satisfactory as dress trimmings.

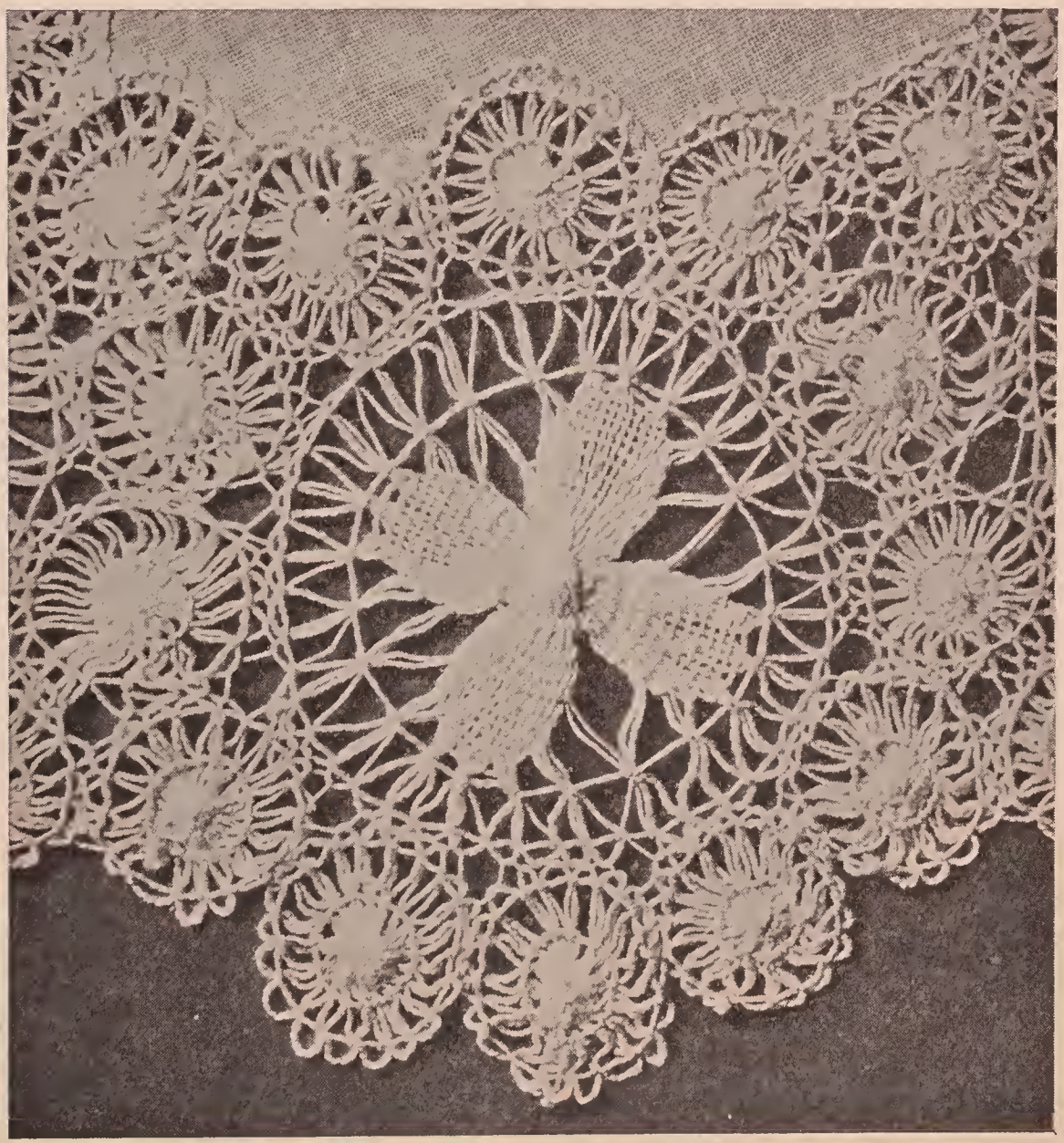
64. Paraguay, or **Teneriffe, lace,** Fig. 29, is a lace characterized by spider-web effects woven of single threads, which are arranged into spider wheels and woven together. The very fine Paraguay laces, which are expensive, are used as dress trimming; the coarser weaves, which are not so costly, are used in fancy work.

65. Pearling, Fig. 30, is a very narrow picot edge used as a finish for dress linings and similar articles.

66. Plauen is a general term that includes all laces originating in Plauen, Saxony, but now made in many other places. Most of them are imitations of many of



Hand-Made Paraguay

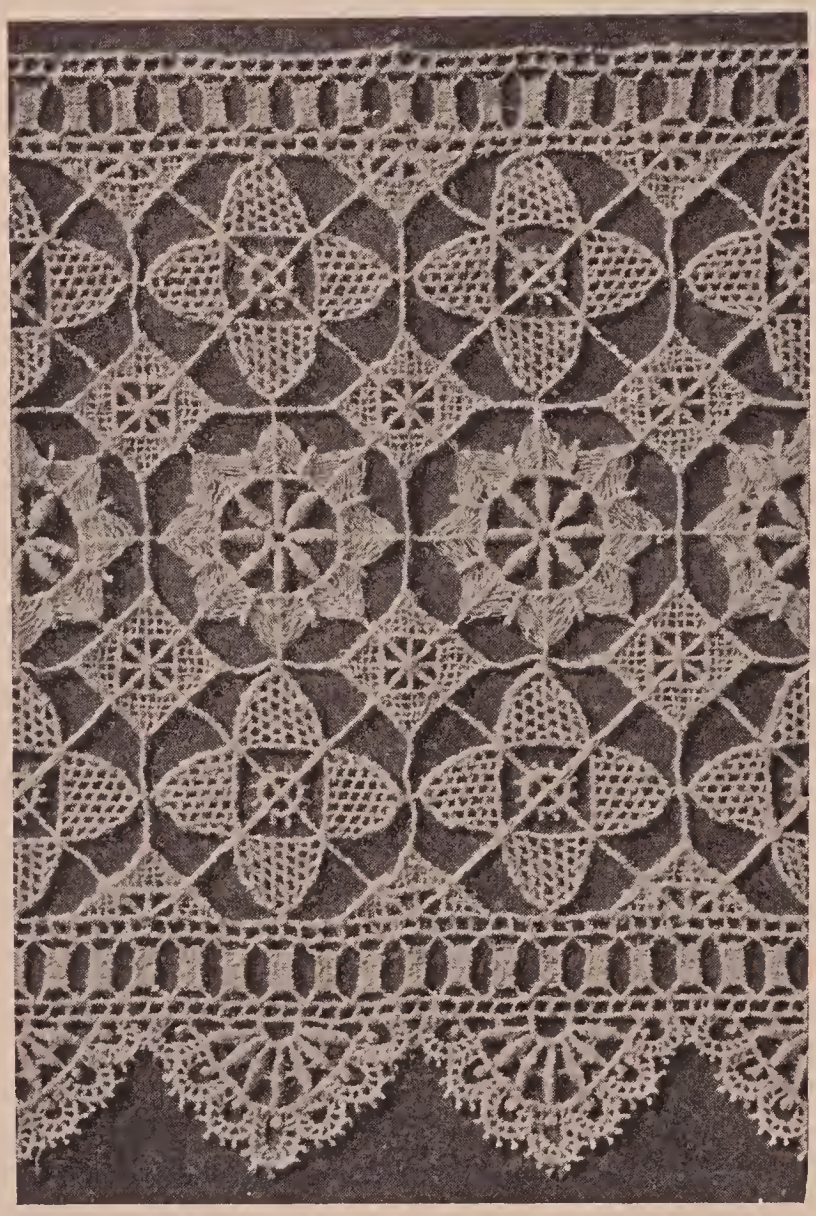


Machine-Made Paraguay

FIG. 29

the beautiful real laces, such as Point de Venice, but new designs are originated from time to time. These laces are produced on the Schiffli machine by embroidering with cotton or silk thread on woolen material and then chemically treating the embroidery so as

Pearling
FIG. 30



Plauen Lace
FIG. 31

to dissolve the wool and leave only the cotton or silk, which then takes on the appearance of lace. Because of the method of making, such laces are somewhat frail and cannot be used where a durable lace is required.

Plauen lace is shown in Fig. 31 and other examples are found in the illustrations of machine-made reticella, Fig. 37, and machine-made Venetian, Fig. 45.

67. Point de Gaze lace, Fig. 32, is a very fine, delicate, gauze-like lace that bears a resemblance to Alençon. Part of the pattern is made in close, and part in open, stitch, the open work

Hand-Made Point de Gaze
Fig. 32

being ornamented with dots. It is distinguished from Alençon, however, in that its designs are not outlined with buttonholing but are merely emphasized with a thread.

68. Point de Paris lace originally resembled Brussels and had a distinctive hexagonal mesh and a flat design. Now, the term is generally applied to machine-made cotton lace resembling

Val but of simple pattern and inferior quality, as shown in Fig. 33. Its figures, consisting of flowers and leaves, are outlined with a heavy cord.

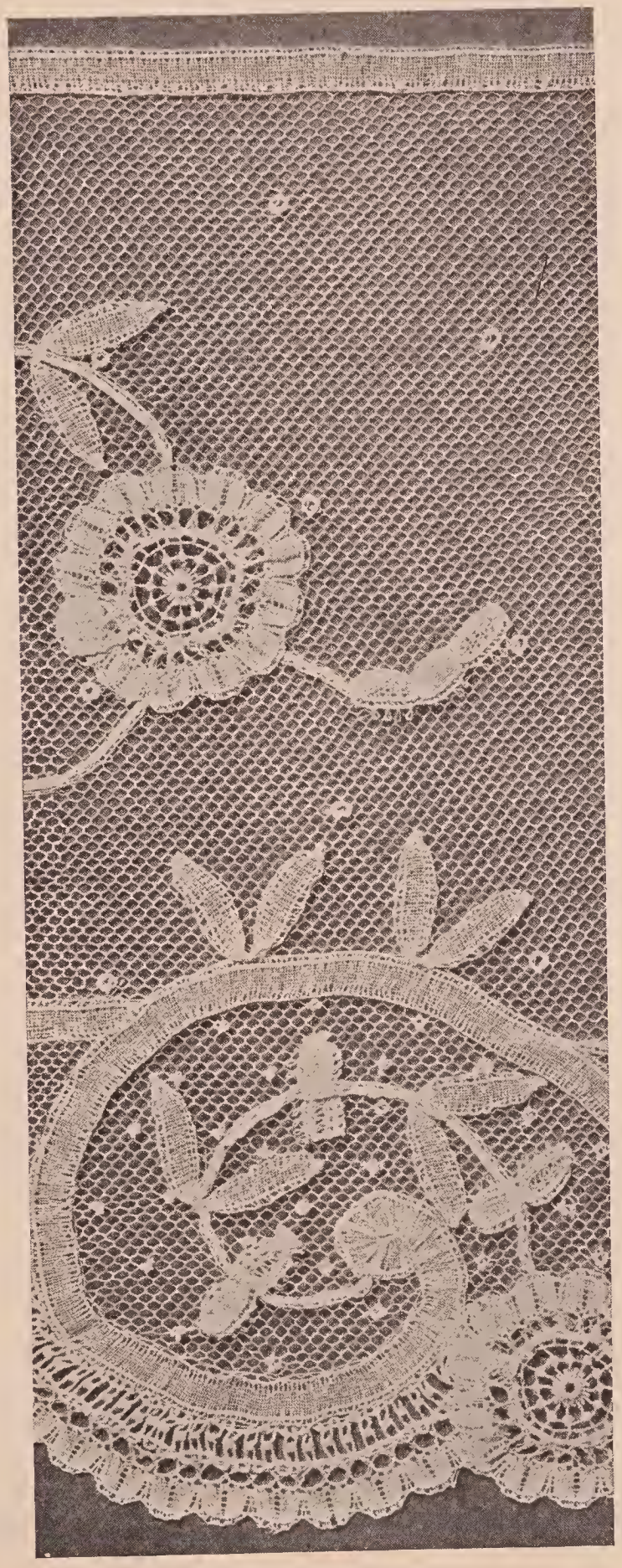
69. Princess lace, Fig. 34, is a delicate, beautiful lace made in imitation of duchesse lace, but often bearing little resemblance

Machine-Made Point de Paris

FIG. 33

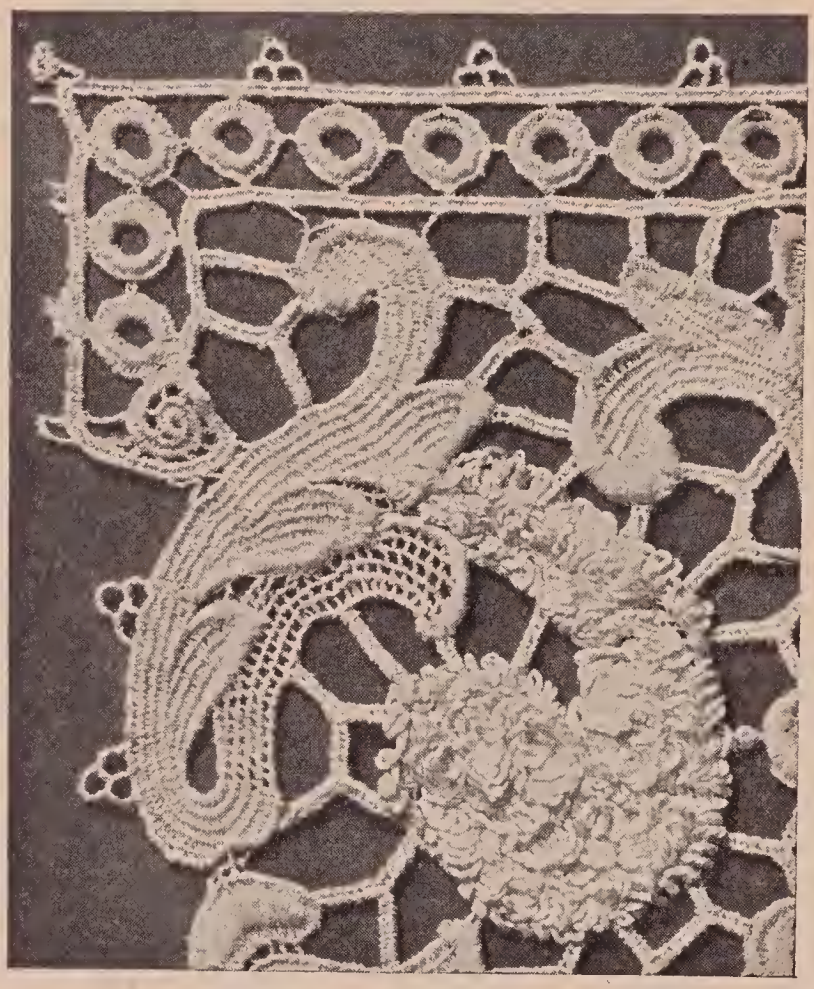
to it because of its net ground. In the best type, the parts of the lace are made separately and then applied by hand to a machine-made ground. As in the case of duchesse lace, princess lace is used chiefly for dress trimming.

70. Ratiné lace, Fig. 35, is an inexpensive machine-made lace having designs that consist of a groundwork of heavy loops, resem-

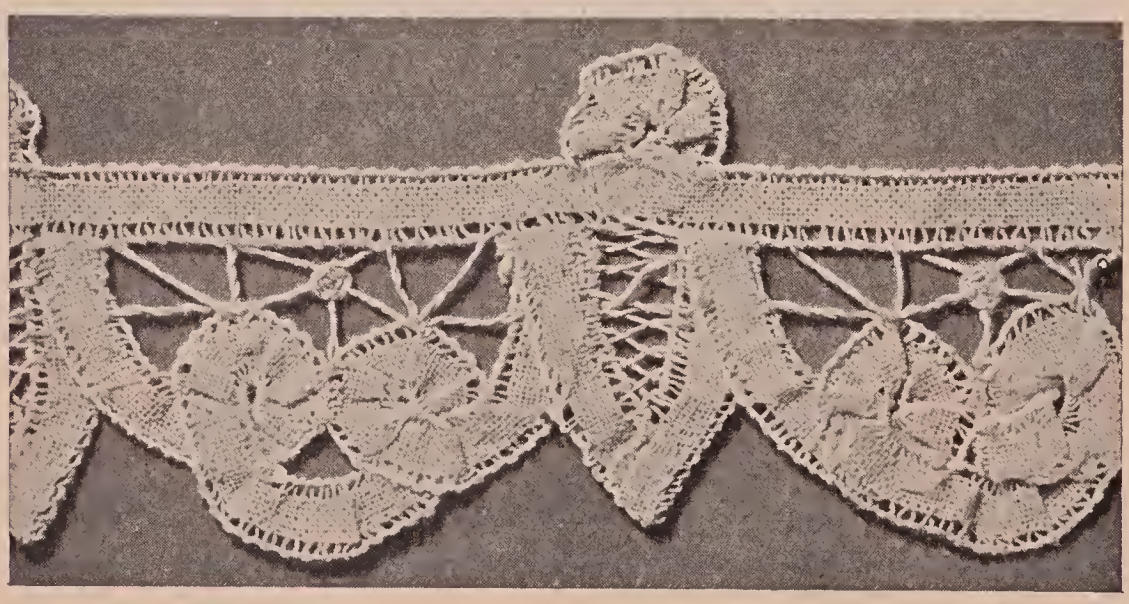


Princess Lace
Fig. 34

bling Turkish toweling. It is generally used on wash dresses that are made of heavy, rough material.



Ratiné Lace
FIG. 35



Hand-Made Renaissance
FIG. 36

71. Renaissance lace, Fig. 36, consists of linen tape woven into motifs and the parts then fastened together with twisted bars,

spider wheels, and other flat stitches. It is lighter than Battenberg lace and not so rich in appearance. The fine weaves of Renaissance lace are used for dresses, and the coarser weaves for draperies.

72. Reticella lace, Fig. 37, was the earliest of needle-point laces, being originally a development of drawn and cut work. Brides and picots were introduced and simple geometrical outlines followed. Later, the foundation fabric or cut work was abandoned and the needlework constituted the entire design. The machine-made reticella resembles the real lace in design, but is in reality a Plauen lace produced on the Schiffli machine. Real reticella lace is very expensive, but good imitations

Hand-Made Reticella

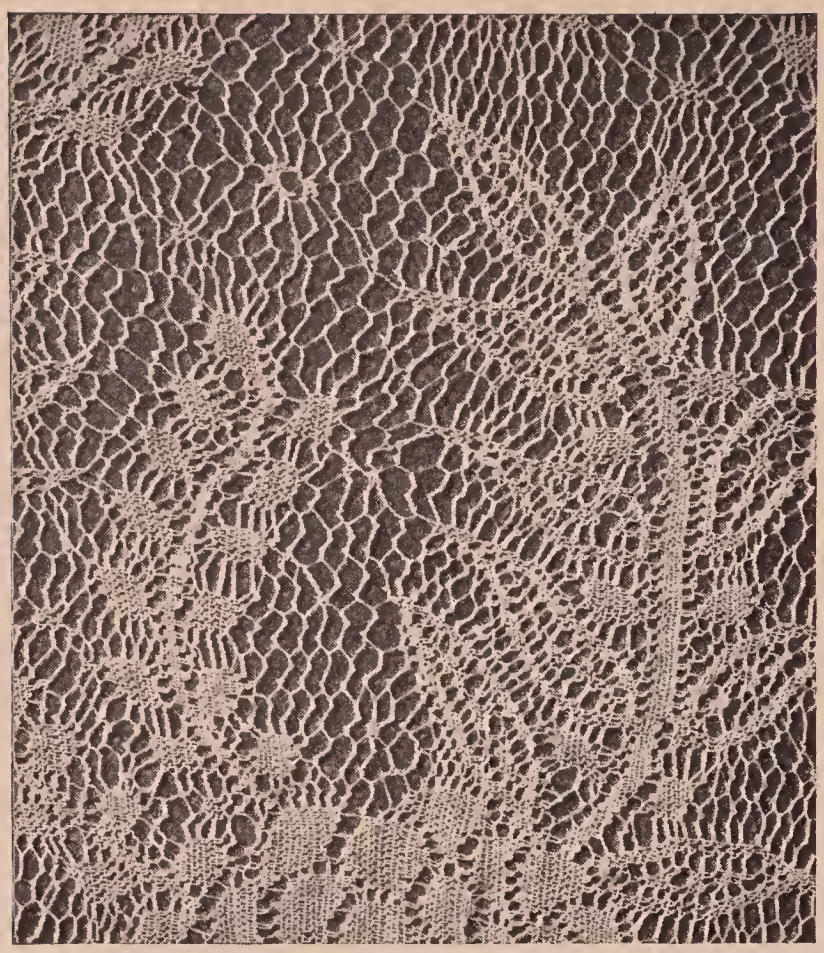
Machine-Made Reticella

FIG. 37

may be procured at a reasonable price. Reticella lace is used for collars and sometimes in millinery work; the finer weaves are employed as dress trimming.

73. Shadow lace, Fig. 38, is a thin filmy lace of fine weave, having an entirely flat surface and rather indistinct designs. It may be of any design or character so long as it is shadowy in appearance.

Shadow lace is extensively used as a dress trimming, its soft, lacy appearance making it desirable for draping purposes. It is not an expensive lace, its price usually being regulated by the fineness of the thread and the design.



Shadow Lace
FIG. 38

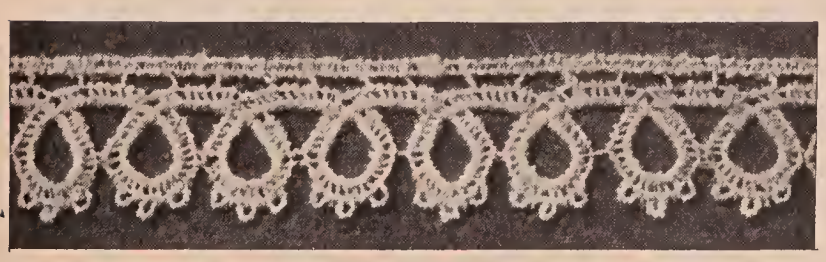
Spanish Lace
FIG. 39

74. Spanish lace, Fig. 39, is a machine-made lace, usually in silk fiber, in imitation of the old Spanish laces, which are made of real silk. It comes in all-over patterns and in flouncings and is characterized by floral designs and sprays on a ground of craquelé net. Spanish lace of this variety is used chiefly for afternoon and evening gowns.

St. Gall Lace
FIG. 40

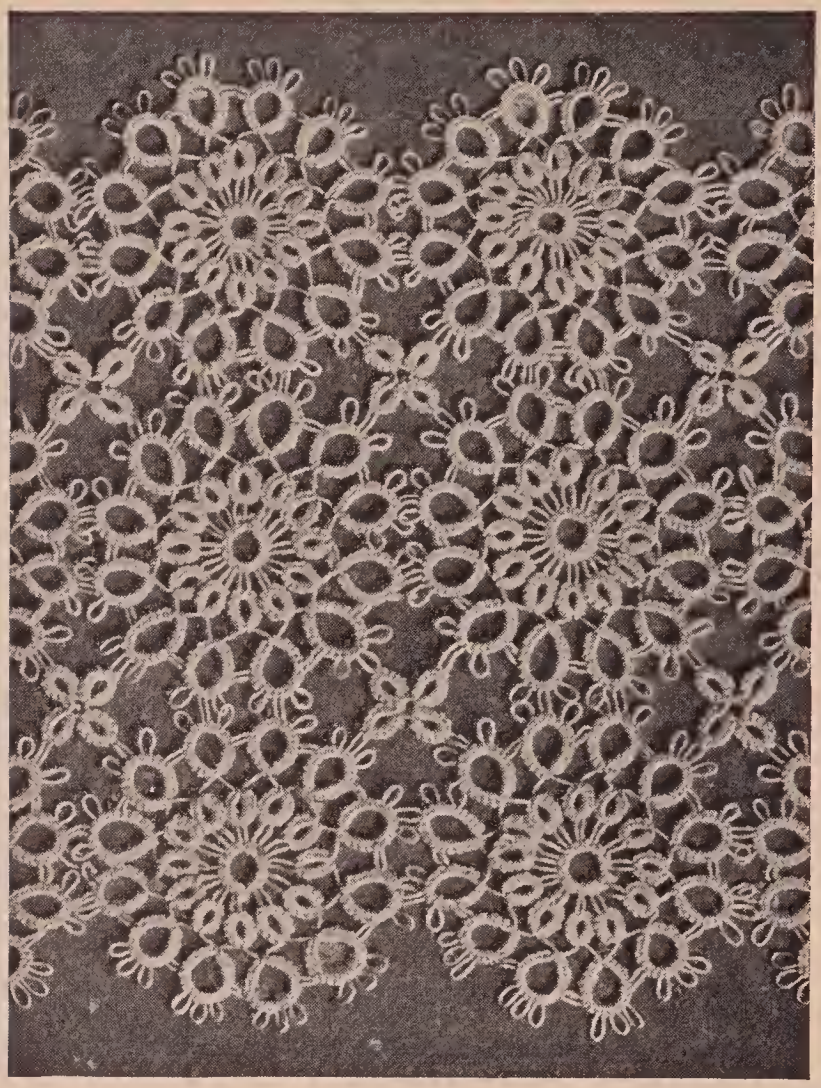
75. St. Gall lace, Fig. 40, is one of the varieties of lace made at St. Gall, Switzerland, the lace center of that country. Many of these laces are similar to those made at Plauen, being both good and poor imitations of some of the lovely real laces, but St. Gall also makes beautiful hand-made laces. The variety shown here has Teneriffe characteristics. The machine-made varieties produced at St. Gall are made on the Schiffli machine and then burnt out to produce the pattern.

Hand-Made Tatting Edging

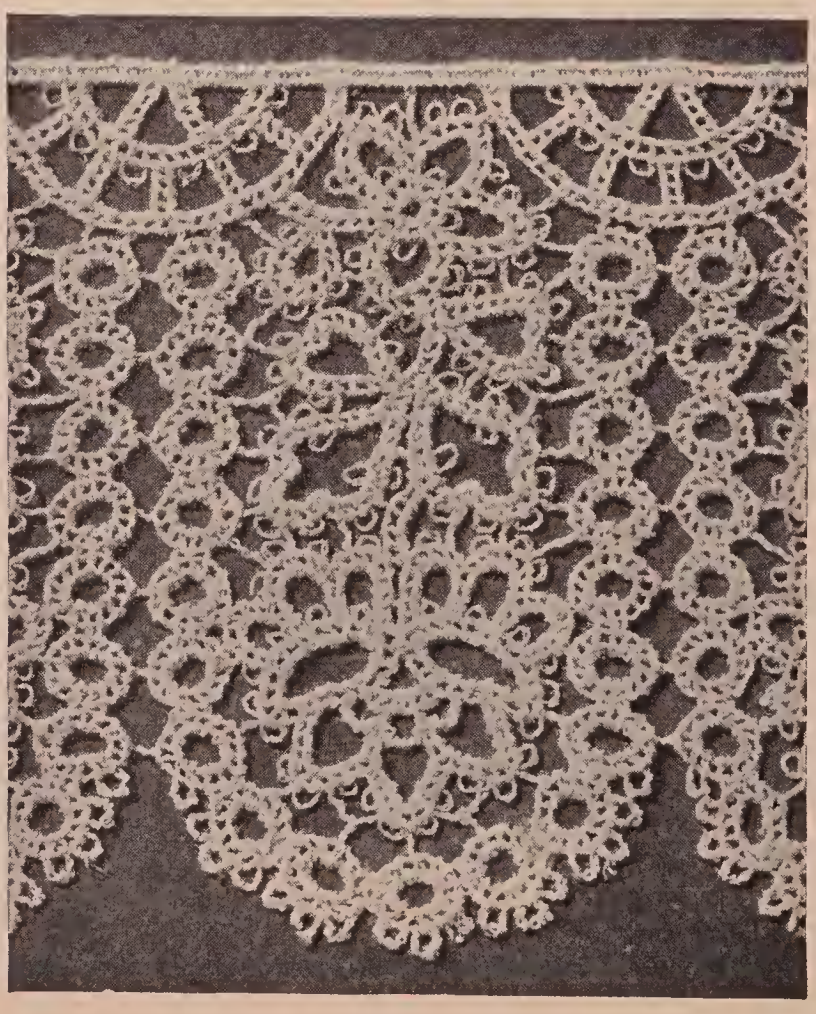


Machine-Made Tatting Edging
FIG. 41

76. Tatting is a form of knotted lace made with an oblong shuttle, around which the thread is wound and by means of which loops and knots are worked. The name is derived from *tattie*, an Indian matting, which it slightly resembles. Tatting is made in the form of a simple edging, as in Fig. 41, and in elaborate

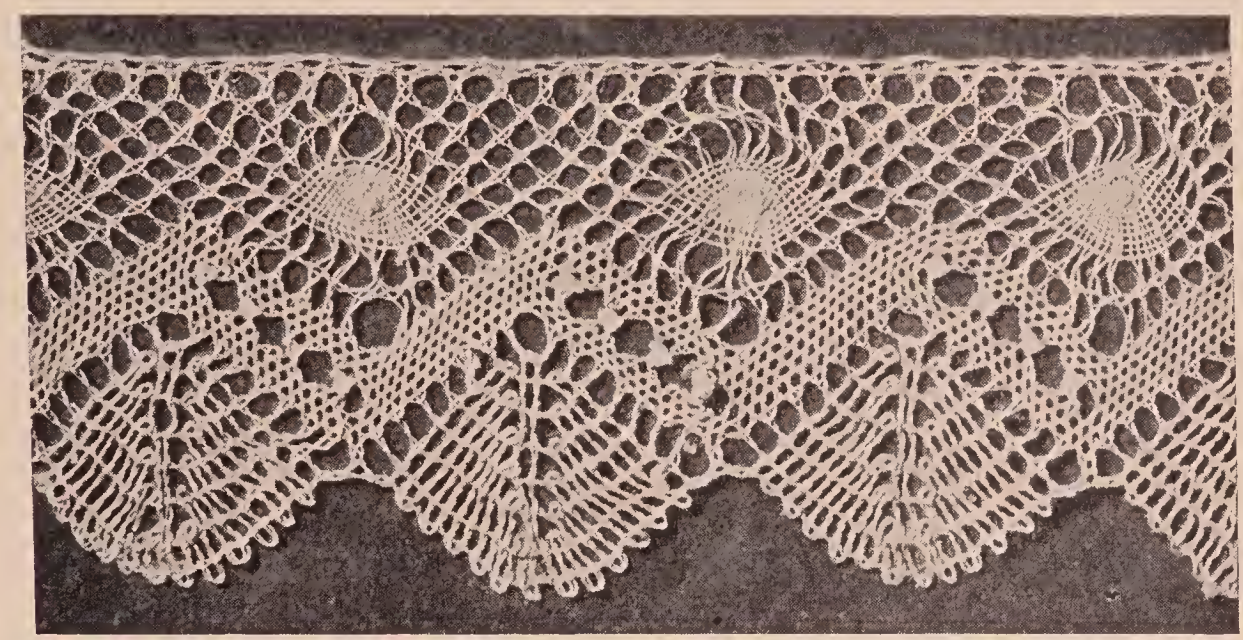


Hand-Made Tatting

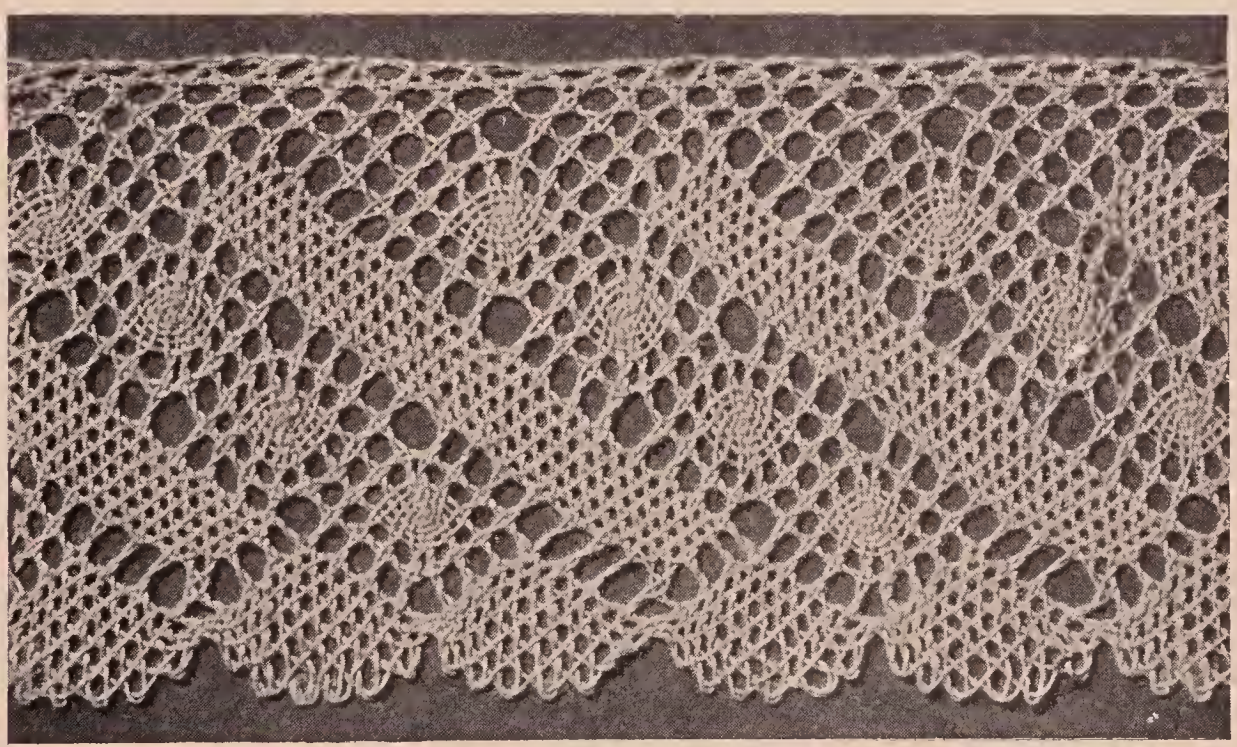


Machine-Made Tatting
FIG. 42

designs, as in Fig. 42. Beautiful patterns are often produced in this lace, it being lighter and more lace-like than any other variety of knotted lace. Many American women are proficient in making clover-leaf and wheel designs, and hand-made tatting of this nature may be purchased at a very reasonable price. Imitation tatting in



Hand-Made Torchon



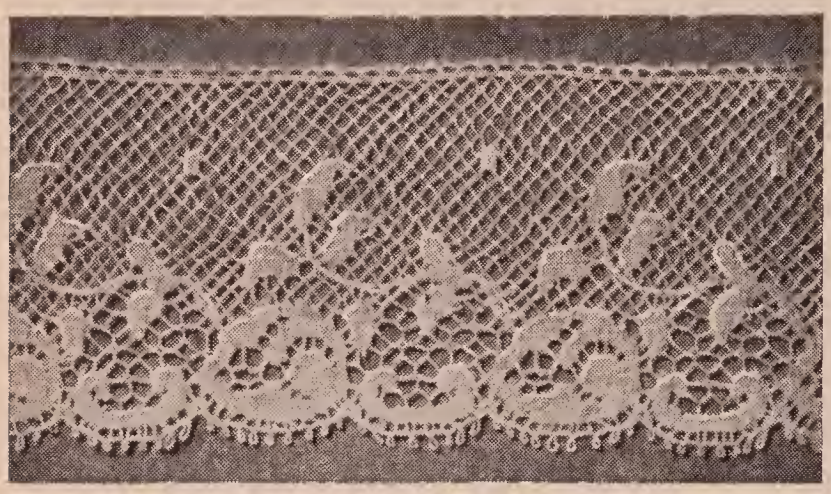
Machine-Made Torchon

FIG. 43

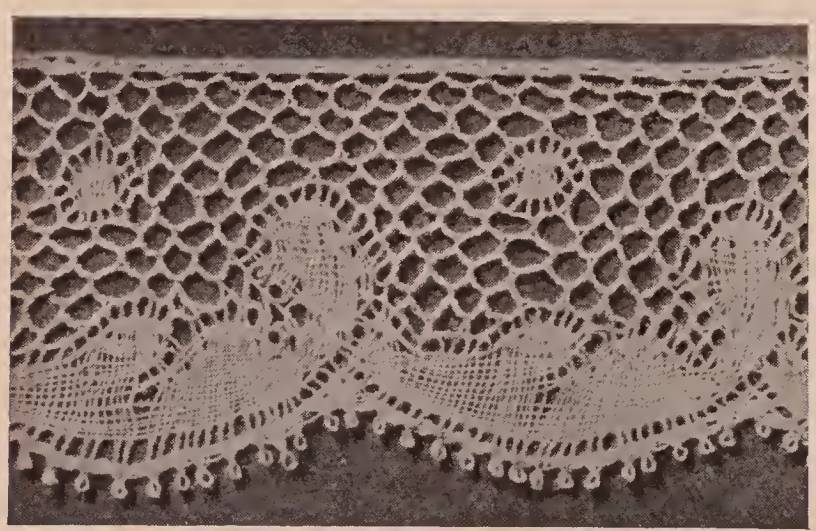
no way compares with hand-made tatting, which is desirable as trimming for lingerie dresses and garments. Tatting is used also on children's clothes and in making fancy work.

77. Torchon lace, Fig. 43, is one of the plainest of the bobbin laces and is made by peasants all over Europe. The better grades

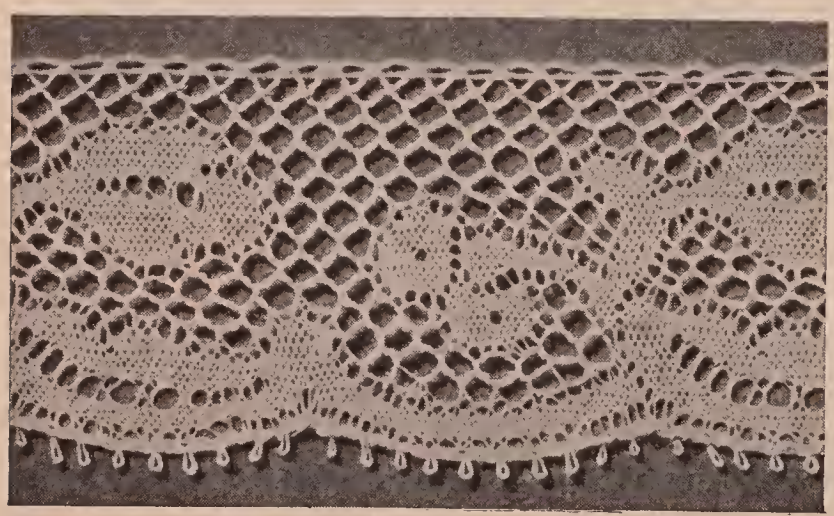
Hand-Made French Val



Machine-Made French Val



Hand-Made German Val



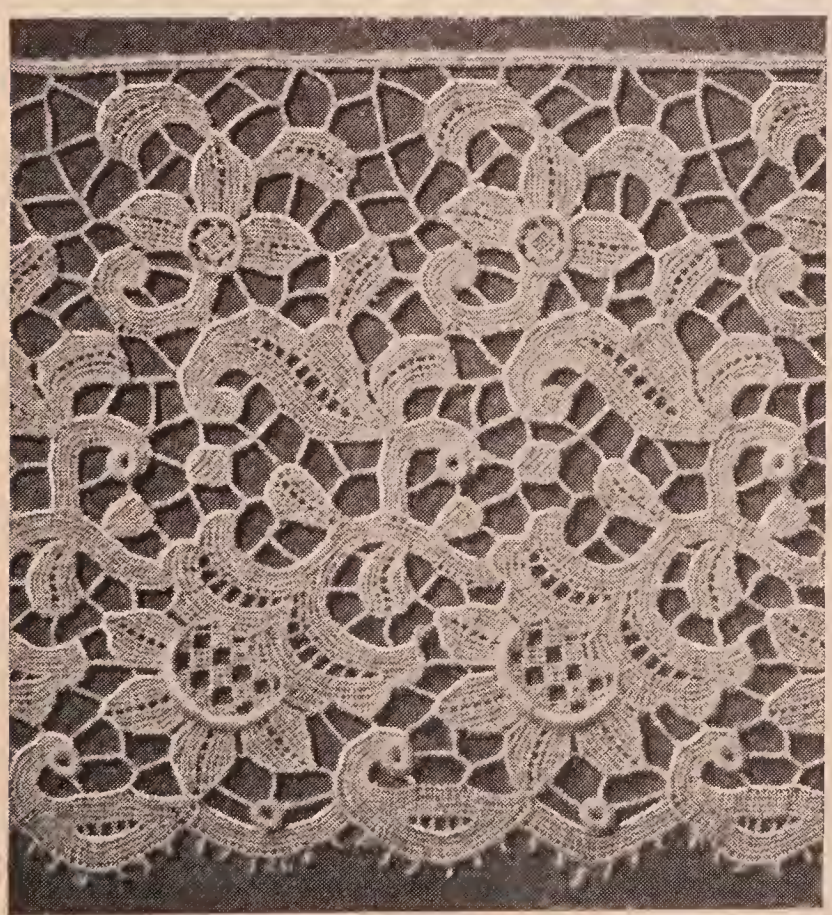
Machine-Made German Val
FIG. 44

of torchon are made of linen thread, and the cheaper qualities, which are commonly called *beggar's lace* or *Bavarian lace*, of cotton. The coarser weaves of torchon are much used in fancy work, and the fine weaves are employed in lingerie dresses. Torchon lace is inexpensive when its wearing qualities are taken into consideration.

78. Tulle is a fine, gauzy machine net. It is fluffy and beautiful when fresh, but is so frail that it has a very short life. Tulle is used on evening dresses, as a hat trimming, and in places where fluffy, airy bows are desired. It is sometimes called *maline* or *illusion*.

79. Val lace, Fig. 44, the common term for *Valenciennes lace*, is a bobbin lace in which the ground and the pattern are woven together. Its designs are flat, but they are very beauti-

Hand-Made Venetian



Machine-Made Venetian

FIG. 45

ful as they contain conventionalized roses, carnations, and tulips. Its mesh is diamond-shaped or round, and very open and regular. For the real Val, linen thread is used, which gives it a firm, durable quality as well as a great delicacy. Much of the French Val is made at Calais, France.

Valenciennes lace is imitated very well on the machine, but as cotton thread is generally employed, the lace thickens up in washing. It comes in several varieties, but the French and German Vals are the best known, the French being distinguished by diamond-shaped mesh and very dainty designs, and the German, by round mesh and larger designs.

Valenciennes lace usually comes in narrow insertions and edgings. It is one of the daintiest laces for sheer lingerie dresses and can be had at very little expense. It is also a good type of lace for children's millinery.

80. Venetian lace, Fig. 45, is a needle-point lace of great beauty that

was made in Venice as early as the 16th century and at first resembled the early reticella except that the cut-like character was abandoned and the needle stitches were used alone. It consists of needle-point motifs or designs joined with an irregular network of brides. The three principal varieties of Venetian lace indicate the different stages in the development of this lace and the time when it was in vogue. They are:

1. Raised point, which is also known as Gros point and includes Rose point, is characterized by raised or padded portions produced by means of working over cotton padding. In the Rose point, which is a general favorite, the design consists chiefly of small roses held together with connecting brides.

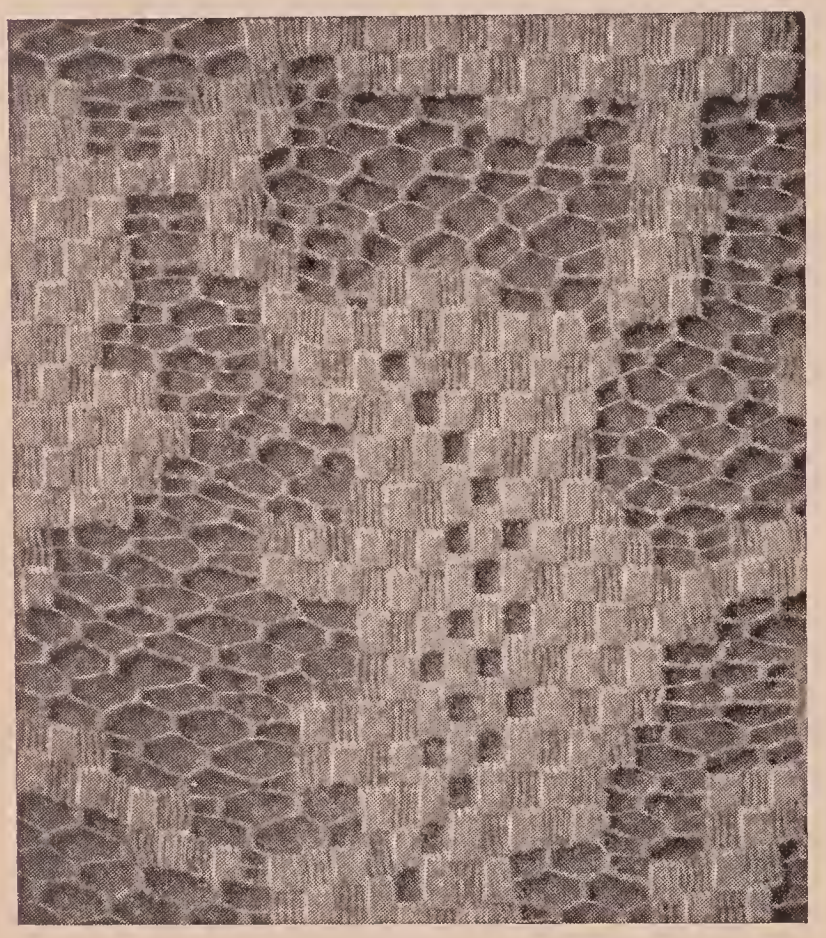


Fig. 46

2. Flat Venetian point, or Point Plat de Venice, differs from Raised point in that it contains no prominent raised work and has smaller designs. Its chief variety is Coraline point, the designs of which resemble coral formations and are connected by many brides. This lace is less beautiful than Raised Venetian point for its designs are irregular and then not so well connected.

3. Grounded Venetian point has its designs arranged on a net ground and lacks ornamentation, thus almost losing its identity as a Venetian lace. Burano point is an important example of this variety.

81. Wool lace, Fig. 46, is a woven lace of varied designs, in which wool thread is used for either the warp or weft thread or for both. The example shown here is of the filet variety. Lace of this kind is used chiefly for dress trimming.